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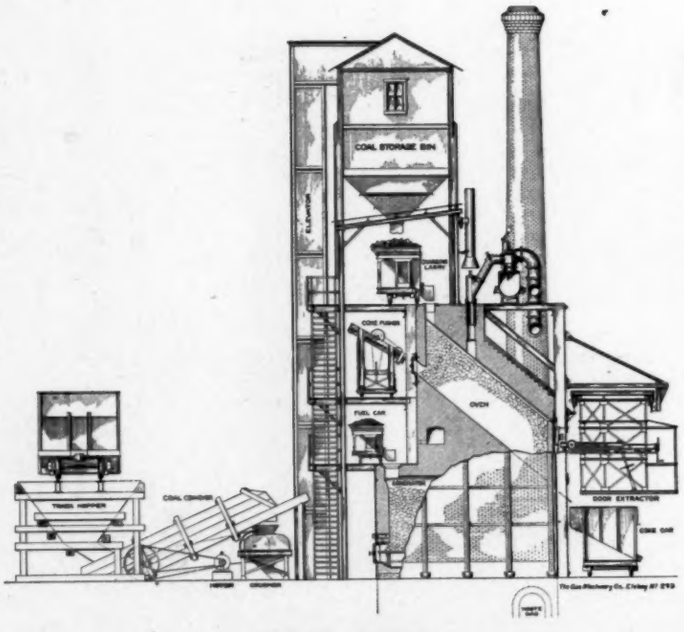

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Leaking Gas Which Finds Way Into Greenhouses Extremely Injurious to Plants, But Simple Measures Will Prevent Its Entrance

Roses Extremely Susceptible to Its Influence—Ferns and Mosses Almost Immune—Untrapped Drain Pipes Provide Easy Means of Entrance—Green Algae a Characteristic Growth on Soils Contaminated by Illuminating Gas

By GEORGE E. STONE

Illuminating gas, whether present in the soil or atmosphere, is extremely poisonous to plants, and sometimes causes considerable injury to greenhouse plants. One of the worst features of escaped gas is its elusiveness, as it may be present in a greenhouse in sufficient quantities to injure a crop seriously without being detected.

Illuminating gas is particularly dangerous to vegetation in the winter when the soil is frozen, at which time it will travel long distances seeking an outlet. When leakage occurs in a gas main in such times, it is most likely to penetrate greenhouses, and when leakage takes place at other seasons of the year, the gas often finds its way to conservatories through untrapped drain tile; or it may follow the surface of the gas or water pipe which enters the house. The soil near the foundation of greenhouses or under the beds is not especially compact, and furnishes fairly good conditions for gas penetration.

Leak from Pipes ¼ Mile Away Works Injury

We are familiar with many cases of injury in conservatories from this cause. In one instance a range of houses was connected with drain tile leading to a sewer one-fourth of a mile distant. The gas pipes in the highway were about the same distance from the greenhouse, and the leaking gas from the main, which may have been a mile or more away, gained entrance to the sewer, whence it was conveyed to the drain tile leading to the greenhouse, contaminating the atmosphere and causing the plants gradually to become sickly and die. The amount of gas entering the greenhouse was so insignificant that it was not detected by the gardener even when it had been present and had injured the plants for two years. There was no trap in the drain tile connecting the greenhouse with the sewer, and the outlet pipe connecting with the interior eave trough, opening directly into the greenhouse, was able to take the gas directly into the house. This could not have happened if the tile had been trapped or if outside eave troughs had been used.

In another case gas escaping from a broken service in the public highway, situated about 100 ft. from the conservatory, entered the house and in a single night affected most of the plants injuriously. This leak occurred in the winter when the ground was frozen. The untrapped greenhouse drain pipe, which was connected with several aquaria and the catch basin located nearby, formed an inlet for the escaping gas confined under the frozen soil. In this conservatory, where illuminating gas had escaped freely during part of the night, the plants most severely affected were: Rose, geranium and abutilon, and ivy, eucalyptus, rubber plant, willow, kenilworth ivy, papyrus, tobacco, tomato and sedum, were also injured. Ferns, mosses and liverworts, which were close to the gas inlet, were scarcely touched. The leaves of rose plants, which turned yellow and fell within a few hours, suffered most severely.

Effects of Gas on Plants Quite Characteristic

The effects of illuminating gas on plants are quite characteristic. In one conservatory, where the gas was scarcely noticeable except on one or two occasions early in the morning before ventilating, we observed that the older leaves of geranium, Bermuda lily, vinca and begonia were invariably affected, while the younger, undeveloped leaves were apparently not burned, although the growth later became stunted. The older branches of vinca lost all their leaves. Those of geranium were either wholly burned or had burned margins which turned yellow or took on a bright coloration. The older leaves of Bermuda lily collapsed, turned yellow and clung to the stems. Carnation foliage was not injured, but the buds failed to open normally. The plants failed to grow and the crop was of practically no value economically. The gas leakage, which continued almost two weeks in this instance, was from the highway under the frozen soil, the pipe line being located about 25 ft. away and parallel to the greenhouse.

In another instance, in which illuminating gas entered a greenhouse during the winter, although hardly perceptible, except on one or two occasions, to the sense of smell, carnations were practically an entire failure, the crop producing very few salable flowers. The carnation leaves became mottled, and cuttings from the plants proved to be a total failure. Snapdragons were all injured, and the flowers produced were a failure. Sweet peas were characterized by a yellowing of the foliage, especially of the older leaves, and subsequently died. Asparagus was arrested in development. Araucarias, fan-leaved palms, rubber plants and bananas were only slightly burned. Ferns, on the other hand, were burned but slightly; their development, however, was temporarily arrested.

General Effect a Burning of the Foliage

The general effect on plants of illuminating gas when present in the atmosphere is a burning of the foliage, the older leaves being affected to the greatest extent. It also causes a stunted growth and weak development; affects the production of flowers and their normal development and induces many freak peculiarities. More often the injury from illuminating gas is such that a plant is practically ruined, and again, recovery may be made, and in the course of time the plant may become normal and salable when arrested development is due only to the presence of illuminating gas in the atmosphere.

Roses appear to be extremely susceptible to illuminating gas, the leaves turning yellow and dropping off a few hours after being affected. The leaves of many plants will curl inward when subjected to gases. Illuminating gas also causes the flowers and buds of tobacco and the nodes of miarabilis to fall. This phenomenon is called chorism, and the air of an ordinary living room or laboratory is often enough to induce it.

When illuminating gas from defective pipe lines enters conservatories having solid beds of plants, the escaping gas will not only injure the plants by burning the foliage, etc., but the soil will become poisoned and the roots affected. Practically all the damage to outdoor vegetation from illuminating gas occurs to

the root system. The injury is much more serious than that affecting the aerial portion or leaves, because in the latter case the plants may revive; but when the roots are affected, recovery is impossible. When the soil becomes impregnated with gas, the gas is absorbed by the water present. The roots then take up the water and translocate it to the various tissues, and as a result the cells become poisoned and the plant dies.

Poisonous Substances May Remain in Soil for Long Period

The poisonous substances contained in illuminating gas may remain in the soil for a long time, and will injure other crops if planted in the same soil. In one case where cinerarias were potted in soil which a year before had been subjected for a brief period to illuminating gas, the leaves of the plants curled, the blossoms were imperfect, and the plants were stunted and showed general malformation. Other plants, like begonias, failed to produce blossoms and were badly stunted; some of the roots were dead and the plants altogether were erratic in growth. Easter lilies were four to five times smaller than similar plants grown in other soil under the same light and temperature conditions. The gas-contaminated soil, however, had no abnormal odor, as is the case with soil freshly polluted with illuminating gas, and chemical analysis of the soil failed to reveal the presence of some of the more commonly poisonous substance although there were toxic substance present.

At one end of this greenhouse where the gas entered, the soil of the walks was covered with a growth of green algae—a characteristic growth on soils contaminated with illuminating gas. This growth was absent on the soil surface in other parts of the range which comprised five or six houses. When soil has been contaminated with illuminating gas it should never be used in greenhouses for any purpose. It is, however, safe to use it for outdoor crops.

Too much emphasis cannot be laid on the danger to greenhouse crops from gas leakage. There is usually trouble before the presence of gas is even suspected. If the gas is found to be escaping into the soil and making its way into greenhouses, digging a trench between the pipe line and the greenhouse and leaving it open for some time will prevent further contamination.

Most Damage Done During Night

The damage to greenhouse crops from illuminating gas is usually very great, even when the crops are subjected to only a few days of exposure. Most of the injury from this gas, when it is present in so small quantities that it cannot be detected by the nose, is done during the night when the ventilators are closed, when its presence is not usually suspected. It is possible for even small quantities of gas to enter a greenhouse at night and to do much damage before it is discovered. In such cases the extent of the injury is hardly realized at first. No one but a gardener fully realizes the cost and worry involved in producing a crop, therefore it is wise in places where greenhouses are located near gas mains to secure protection against possible leakage by the installation of effective devices, which will not only make it possible to detect leakage in the gas main immediately if it occurs in the vicinity, but to prevent the gas from entering the greenhouse.

Mill Scale Stimulates Corrosion in Rapidly Rusting Materials and Retards It in Slowly Rusting Materials

The following conclusions have been reached as a result of corrosion resistance tests on iron and steel as reported by E. A. Richardson and L. T. Richardson:

Copper-bearing steels are decidedly superior to pure iron, steel, or charcoal iron.

The addition of copper to pure iron increases its resistance to corrosion, but to no such extent as similar additions to steel.

Charcoal iron and pure iron are superior to steel as regards resistance to atmospheric corrosion.

Charcoal iron is very similar to pure iron in its resistance to corrosion.

Copper is believed to decrease corrosion due to some mutual influence of manganese and copper.

The additions of large amounts of manganese and copper to pure iron or steel are suggested as well as additions of copper-chromium, copper-vanadium, copper-tungsten, or copper-molybdenum.

Mill-scale stimulates corrosion in rapidly rusting materials and retards it in slowly rusting materials.

Many Factors Combine to Bring Gas for Industrial Fuel into Greater Prominence

An Enormous Outlet for Gas Consumption Awaits Industry Provided It Gains Possession of It Now, but It Must be Alert—Best of Service and Most Modern Engineering Methods Should be Applied in Industrial Installations

Several factors are combining to bring the use of gas for industrial purposes into greater prominence and to encourage and warrant increased attention by gas managers everywhere to this branch of their business, stated the report of the Committee on Utilization of Gas Fuel Appliances, of which W. J. Serrill is chairman, presented at the recent annual convention of the American Gas Institute. These factors are: The cumulative educational effect on manufacturers of increased efforts of the gas men to introduce gas for industrial purposes; the increased efforts by gas appliance makers to meet the needs of every opening for the use of gas; the great development of factories and processes of a class suited to gaseous fuel; the rising prices of competing fuels, as oil and coal; the growing practice of gas companies to make graded rates to large consumers; and last, to some extent, the stimulus of competition due to the strong and persistent efforts of the electrical industry to appropriate as far as possible this same field of industrial fuel.

Competition in Furnace Field

As gas lighting has been threatened by the successful competition of the electric light, so, in a lesser degree, is the electric furnace beginning to compete with the gas furnace. In some localities, the electric companies have made very low rates for this class of service, rendering the electric furnace, in such places, a real competitor to the gas furnace.

An enormous outlet for gas consumption awaits the gas industry, provided it strives to obtain it now, and actually gains possession of it; but the industry must be alert. It is far easier to defend a ground already occupied than to recover it after it has been lost.

Not only should great energy be applied now towards this end, but the best of service and latest of engineering methods should be employed in industrial installations.

The services of skilled, experienced engineers should be adopted. Such gas companies as have no men of this type can get expert advice and special designs from several companies whose specialty is the designing and making of gas appliances for the industrial field.

In some places, and for many purposes, it will be found necessary to establish low rates for gas used industrially over long hours and in large quantities.

The gas man who proceeds on the above lines has every reason to take an optimistic view, and will achieve the success for which he strives.

Necessity of Guarding Against Vitiating the Atmosphere

Special attention is required for that class of industrial installation, in which a number of operatives, each using his own torch or burning appliances, is grouped in one room.

The tendency of some of the numerous appliances to get out of perfect adjustment, either accidentally or through ignorance of the operators, and consequently to deliver a modicum of the products of incomplete combustion into the room, thus vitiating the atmosphere, should be guarded against.

In some cases, this condition has brought the use of gaseous fuel into disrepute. Gas men are advised to investigate the several systems now on the market, in which a perfect pre-mixture of gas and air is made and delivered to the operatives' burners.

In this case, there is nothing to adjust or get misplaced at the burner, and perfect combustion is assured.

Such pre-mixture systems must, of course, be provided with adequate means to prevent back-firing and explosion at the mixing machinery. These means are well developed at the present time.

El Reno Company Obtains Big Natural Gas Consumer

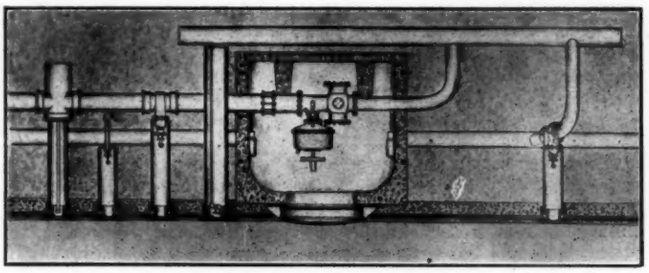
Natural gas service in El Reno, Okla., in which the distribution system was recently completed, has been extended to a large mill which requires 11,000,000 cu. ft. monthly.

Effect Economics by Adopting Round Type Regulator Pits in San Francisco

D. E. Keppelmann Asserts Advantages of Type Are Too Obvious to Require Elaboration, the Initial Cost Being 50 Per Cent Under That of Type Formerly in Use

The Pacific Gas & Electric Company maintains in the city of San Francisco thirty-two pits, in which are placed the high pressure district regulators. These are of the upright valve, double diaphragm type, and their duty is the reduction of the gas pressure from pounds per square inch to a low pressure of inches of water, at which pressure the gas is distributed to the consumers.

The pits are built at certain points about the town, which, from their location, control and regulate the flow through the mains



GREATEST GOOD DERIVED FROM ROUND PIT IS IN BEING ABLE TO HAVE PIPE DRIP ON HIGH SIDE

in their respective districts, maintaining an even pressure, especially during "peak" or heaviest consumption hours.

Each is equipped with full complement of valves, by-pass, governor and high and low self-recording gauges.

All pits are inspected once each day, and the gauge charts renewed and brought in to the office, where they are tabulated and filed.

In construction, the pits are made now of a uniform 1-3-6 mixture (the older pits are not of uniform mix) with ¾" twisted steel reinforcement, both horizontal and vertical in the round pits, while the square pits, in addition thereto, have a roof reinforcement of railroad iron.

The general lay-out of these pits is shown in the photograph, reproduced herewith, and the actual cost of the older pit construction is tabulated as follows:

Cost of Round Pit

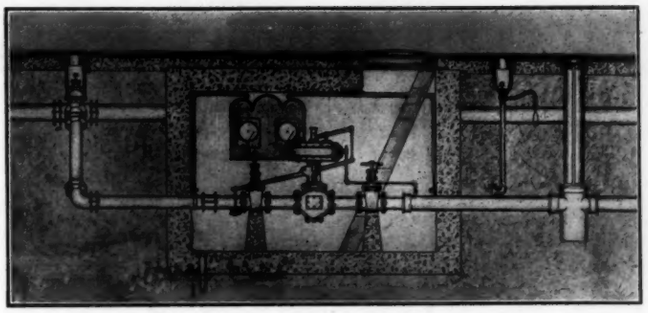
7 ft. High, 6 ft. Diam., 6 in. Wall, 6 in. Floor, 6 in. Top

3 cu. ft. Sand @ $2.25	$ 6.75
3½ cu. ft. Rock @ 2.75	9.60
20 sacks Cement @ .60	12.00
132 ft. ½ in. Twisted Steel Rods	3.30
Manhole Frame Cover	38.25
Teaming	20.00
Labor	48.00
Total	$137.90
Governor Valves, Fittings, Pipe	480.00
H. P. Drip & L. P. Drip	109.00
	$726.90
Teaming	7.50
Labor	66.00
Grand Total	$800.40

Cost of Square Pit

8 ft. x 10 ft. x 6 ft. 6 in. Deep

17.9 cu. yds. Rock	$ 49.20
91 sacks Cement	52.30
6 cu. yds. Sand	13.50
100 ft. R. R. Iron	15.80
Labor	182.00
Teaming	96.00
	$408.80



SQUARE PITS REQUIRE TWICE AS MUCH CONCRETE AS NEWER TYPE

Manhole frame, cover and lumber	38.50
Miscellaneous	50.00
	$497.30
3 x 4 Governor	57.00
2 3 in. Gate Valves	37.00
2 4 in. L. P. Gate Valves	15.20
1 2 in. Gate Valve	8.00
1 H. P. Gauge	40.10
1 L. P. Gauge	39.10
Fittings	183.75
Pipe	35.00
Labor	160.00
Teaming	20.00
H. P. Drip and L. P. Drip	109.00
	$1,201.45

The round pits require about 8 cu. yds. of concrete each, and the square pits require 19.6 cu. yds.

The advantages of the round pits are too obvious to require elaboration, according to D. E. Keppelmann, general superintendent of the gas distribution department of the Pacific Gas & Electric Company, the main item being, of course, the initial cost of installation, reduced by more than 50 per cent. The greatest good is derived from the use of the pipe drip on the high side. This has a very important bearing on the economy of governor repairs. All the accumulation of dust, dirt or grit of any kind will deposit at a point beyond the junction of the governor branch and the drip. The blow off valve, situated at the end of the drip and accessible from the surface, takes care of all accumulations in the drip other than such material as may be too heavy to be lifted by the pressure carried on the high side. The by pass valves, low pressure drip, high and low gates are all reached from the surface.

The drip itself, is made of a plain piece of pipe, with branches welded in the field. As in the case of all other recent high pressure installations, no fittings are used.

As compared to the square pits, the actual labor involved in placing or replacing the governor is lessened on account of the greater ease of access, and the better light.

A feature not shown in the enclosed prints is a 4 in. vent pipe, running from some convenient place near the ceiling and leading to the nearest light or telegraph pole, alongside of which the vent is run up for about 14 ft. That portion of it which is exposed, is incased in a plain covering of 6 in. x 6 in. lumber, up to the tee crown at the top.

The items of material are subject to considerable change, due to the fluctuations of prices. All pits are being standardized as to equipment; the valve standard adopted is a valve with regrinding seats.

In connection with the pits and high pressure lines, there are 110 valves on the high line, placed in such locations as will enable the closing down of a part of the system without crippling the remainder, and also 165 low pressure valves.

As to regulators and governors—after many years of use of the different makes, the No. 1, 2 and 4, for small service, and the 3 in. x 4 in. and 6 in. x 6 in., for use in pits, line and house regulation, have been found to be most satisfactory.

All regulators and governors are repaired in the company's shop, and all are tested and repainted before leaving.

In Purchasing, Quality, Service and Price Should be Considered in Order Named

Purchasing Department Should Keep Itself Well Informed—Modern Buying is an Actual Knowledge of Existing Methods Coupled with a Persistent Effort to Evolve Better Ones

A Purchasing department is an insurance against excess buying, inferior quality, high prices and poor deliveries.

Modern buying is an actual knowledge of existing methods coupled with a persistent effort to evolve better ones.

Modern buying also means standardizing everything possible, with the result that a large number of purchases are made on standard uniform specifications.

These statements were made by N. L. Morse, purchasing agent of the Southern California Gas Company, in an address before the recent annual convention of the Pacific Coast Gas Association held at Santa Barbara, Cal. The purchasing department, according to Mr. Morse, should have a knowledge of: Sources of supply, past and estimated future consumption, quality, prices and intended use of material purchased.

This knowledge is obtained by never ending study, and should be so tabulated as to be instantly available. The methods of obtaining this information, are through observation, literature, membership in associations and commercial friendship.

Advisable to Occasionally Visit Sellers

It is advisable for buyer to visit vendors periodically, noting if their stock is adequate and well kept. Also for the purpose of checking up their delivery equipment, forming a definite opinion whether they could properly serve him in event of an emergency.

It is also part of the buyer's duties to visit the company warehouse as often as practical, to check the quality of material purchased, as well as arrange for disposition of scrap and obsolete material.

The buyer who makes it a point to see in actual use the material he purchases, possesses a very considerable advantage over the one who does not do so.

In literature the buyer should have standard trade registers, such as, Thomas', MacRae's, Hendrick's; trade papers in his own and allied lines; government publications, the value of which is too often not half realized; weekly bulletins of the National Chamber of Commerce, and the Year Book of American Society for Testing Materials.

He should be a member of trade associations in his own line, the Purchasing Agents' Association, the local chamber of commerce and the local "Ad" club. Commercial friendship is a most vital factor for service. A friendship with all vendors and their representatives should receive intensive cultivation.

Provisions for Emergencies

The buyer at all times should have with him an auxiliary memo book, showing residence, phone numbers of heads of business, to enable him to get in touch with them at night in case of emergency.

He must maintain a standard of honor and dependability which will merit the respect and attention of the seller and must be free from prejudice, and willing to be guided by the results of investigations made by himself and others.

A buyer can never tell when he is going to learn of something valuable to him. He may see some new method in a plant entirely foreign to his line, which may be applied with a considerable saving. An "Ad" in a trade paper, a circular in the mail or a scrap of overheard conversation, may result in a yearly saving of thousands of dollars.

Cheapest is Not Always Best

The old saying that the "best is the cheapest in the end," does not always apply, for under certain conditions a cheaper article may represent economy, and it is only by seeing the article in use that the buyer can determine what to purchase.

In purchasing, quality, service and price should only be considered in the order mentioned. The saving in first cost is not the point to be sought, but the maximum service for the amount expended.

The advantages of centralized buying have been very forcibly brought to public attention in the adoption by seventy-five of our cities of the Commission Manager plan of government. To illustrate the point, I quote from the first annual report of the City Commission of Dayton, Ohio, dated January 1, 1915, which reads: "Through a standardization of all supplies and materials, and by combining purchases of the various departments and taking advantage of the market conditions, there has been effected a saving of thirty-three thousand dollars this year over prices paid last year without sacrificing quality."

The fund of good information obtained through combined effort has never been realized by buyers until recently; the Purchasing Agents' Association being of recent origin. Free illustrated lectures have been given by manufacturers to the Purchasing Agents' Association of Los Angeles, which were very instructive and could have been taken advantage of before, had there been an association to receive them.

Through the local chamber of commerce, the author has located small manufacturers who neither advertise nor employ salesmen, their output being taken exclusively by jobbers. On solicitation, however, they were found willing to supply our requirements at jobbers' prices.

Another function of the buyer is to keep alive competition between the big house and the little fellow, and this calls for diplomacy which the successful purchaser must possess in marked degree.

Personal Contact Still Necessary

Some writers argue that personal contact between buyer and seller is no longer necessary. The author takes exception to this, believing that greatest efficiency comes only through mutual helpfulness, and that a friendship with salesmen and heads of business, places the buyer in a position to receive service that could not possibly be obtained any other way.

Large losses are so glaring as to attract attention, which at once stops them. Small losses whose total if allowed to continue would eclipse the aggregate of the large ones, are generally speaking stopped through the efforts of the purchasing department. Efficient buying not only produces lower operating costs, but through the resultant economy in selling expense to the vendor, enables him to quote a lower price than formerly.

Stability of Lighting Properties Due in Part to Public Regulation

In a letter recently sent out to brokers and financial interests generally, by a committee of the National Electric Light Association, the security and stability of lighting properties is pointed out. The letter says:

"The gas and electric business stands almost alone among the various classes of business, in that the question of fair division of income has been reviewed and agreed upon by the highest courts of the United States, as well as courts of the individual states and public service commissions. The results are clearly demonstrated in the statistics of the industry.

"Investigation will show that the physical condition of the majority of gas and electric properties is far ahead of what it was 10, 15 and 20 years ago, and the character of service to the public has improved to a marked degree. In the early days of the lighting business, the investor risked his money to enable the companies to extend their lines and improve their properties for the mutual benefit of the various public interests; while to-day the co-operative spirit shown between the public and the companies, and the fairmindedness shown by the public service commissions, in settling differences between the consumers and the companies, have had a very strong influence upon investors."

Eliminating the Factor of Competition

It is not many years since the statesmen, reformers and politicians came to the conclusion that to get economical results we must have monopoly. Twenty or twenty-five years ago the only idea was to regulate by competition the business in which we are engaged. That resulted in duplication of franchises and duplication of properties, loading the capitalization, which, fortunately, as a whole, has been absorbed in the intervening period, or by the increase in business and improved conditions of the communities. Public control of charge for service, based on cost plus a reasonable profit, and eliminating the factor of competition, is the proper safeguard for the interests of users, taxpayers and investors.—*Froman address by Samuel Insull.*

Oxy-Actylene Welding Rapidly Taking Its Place in Distribution Work as A Means By Which Many Things Hitherto Considered Impossible Can Be Accomplished

Greatest Accomplishment Has Been Gas-Tight Main—Small Details Many Times Not Thoroughly Understood Cause Unsatisfactory Work or High Costs—Ditch Joint Takes Two or Three Times as Long to Make as Does Turning Joint

Oxy-acetylene welding in distribution work is very rapidly taking its place as a means by which many things may be accomplished, which in the past have been considered almost impossible of realization. Of these, the absolutely gas tight welded main has been the greatest accomplished.

The welded gas main is fast becoming the accepted practice, especially for the distribution of gas under high pressure, and is very rapidly displacing the old threaded joint.

The first welded gas main laid in this country was during the summer of 1911, since which time many miles have been laid, but as yet the practice is comparatively new to many distribution engineers, and to those who have adopted this method of making the pipe joints, many things are yet to be learned, each from the other, before a standard practice will be established.

As oxy-acetylene welding became better understood, the gas engineer was quick to perceive a much wider field for its use than was first thought possible, until to-day it is employed in service, shop, and repair work with equally as great success as it has been in new main work.

These statements were made by Charles Wilde, engineer of mains for the Philadelphia Suburban Gas & Electric Company, at Chester, Pa., in a paper presented before the American Gas Institute, at its recent annual convention, from which the following has been abstracted:

Welded Joint Has Two Leading Essentials

Many times the small details are not thoroughly understood or appreciated, resulting in unsatisfactory work or in high cost. To illustrate this, consider an operator making a welded joint in which he is compelled to work in an uncomfortable position, resulting in slow work and very often an unsatisfactory joint. On the other hand, if he be working in a comfortable position the weld will be made with no interruption for rest, and resulting in better time, and a better weld.

Of all the trouble in gas main work the joint has always given the most, and until the adoption of the oxy-acetylene welding, the leaking joint was always present to a more or less degree. When welding was first considered in connection with high pressure distribution, it was not with the object of securing a cheaper joint, but with the possibilities it offered of securing a joint which would be absolutely gas tight, the cost being a secondary consideration.

The welded joint has two leading essentials; the first being that the joint should be made absolutely gas tight, and the second that the weld should have sufficient strength to stand all contraction strains. The first essential admits of no modification or variation; the second will, however, admit of considerable variation.

When the operator becomes proficient and thoroughly understands the conditions necessary to make a gas tight weld, very seldom will a joint be found that leaks. The essential point to guard against in making a gas tight weld, is the porosity of the metal due to its being over-heated. The sign which will tell the operator of the foregoing condition is the boiling or globules which will show in the molten metal. The object to be attained is to bring the metal of the two ends of the pipe and the metal being added, to a point in temperature that will just make the molten metal run together in one mass. When bringing the metal to the necessary molten state, the operator should be constantly moving his torch from one side to the other in order that the flame will be constantly coming in contact with both ends of the pipe, and at the same time the rod of filling metal should be held in contact with the flame. This motion of the torch will be at the rate of about forty or fifty complete movements per minute if the proper size tip is used.

Proper Size of Tip an Important Point

An important point which should not be overlooked in making a weld is to have a thorough knowledge of the proper size tip which should be employed for good results. The tip which should be used is the one that will bring the metal of the pipe and the filling metal to a welding temperature in the shortest possible time, and yet not so quickly that it would not permit of a thoroughly homogeneous weld being made. For good work the following practice seems to give the best results: For small mains up to and including 2 in., a No. 6 tip should be used; for mains from 3 in. to 4 in., a No. 7 tip; and for mains larger than 4 in., a No. 8 tip should be used.

To illustrate to what degree of efficiency a welder may attain by thoroughly understanding his work and following out the principles necessary to make a good weld, it will only be necessary to give the experience of one of our foremen. On the first job which he laid with welded joints—and one on which he did all the welding under instructions—he had nineteen leaking joints out of twenty-three made. This somewhat discouraged him, but during the summer of 1914, this same foreman laid, in one operation, 2,000 ft. of 3-in., 10,000 ft. of 2-in., and 3,000 ft. of 1½-in. pipe, without having a single leak at the welds. During the past spring, on an 8-in. extension on which from three to five welders were constantly at work, in four miles only four very slight leaks developed under a test pressure of sixty pounds.

Another Very Important Point to be Observed

Another and very important point to be observed in making a welded pipe joint is in having the pipe turned away from the welder. He will be able to weld just off and away from the side of the pipe on which he is sitting. When working in this position the molten metal will have a tendency to come in contact with the hot metal of the weld ahead, rather than with the cold metal to the rear of the point of welding and will contribute to making a good weld.

The torch which has been found to be best suited for welding gas mains has a 90 deg. head with straight rear connections. This torch will permit of the operator getting at the point in the circumference of the pipe where he desires to weld, whether it be on the under side of a ditch joint or on the upper side of a turning joint, with the least possible inconvenience.

In order to distinguish the conditions under which a joint is made and for comparative purposes, they will be divided into three classes and will be termed "Ditch," "Stationary," and "Turning." The ditch joint, it will be understood, is the one made in the ditch; the stationary joint, the one made above the ditch but without turning the pipe; the turning joint, that which is made with the pipe being turned in order to bring the joint being welded to the most convenient point for the operator.

The ditch joint will take from two or three times as long, and the stationary joint generally about twice as long as it does to make the turning joint. On this account they should be avoided where possible.

The ditch joint should be made only at points where it is absolutely necessary in order to make a connection when some obstruction makes it the only one that can be used.

Stationary Joint Cannot Be Absolutely Dispensed With

The stationary joint cannot be entirely dispensed with under any circumstance, as it is required at every point where long sections of the pipe are being connected together, or at any point where a valve or drip is being placed.

It was at first thought that this joint could be almost dispensed with by twisting the pipe to one side and then to the other, thus enabling the weld to be made on the sides and top of the pipe.

However, this has been found to be impracticable and would, if it were possible to do so, require so many men to wrist the pipe that it would far exceed in cost the same joint when made stationary.

The number of such joints can, however, be kept to a very small proportion of the whole number required by welding the pipe in as long sections as it is possible to handle.

The turning joint is the most economical to make and on this account the number should be kept to a maximum. The principal contributing factor in making this the quickest and most economical joint, is the fact that the whole weld is made at the point in the circumference of the pipe best suited to quick welding.

Further considering the joint from the standpoint of strength it will be found that it may be made perfectly gas tight, and yet may be made so light that it would lack the necessary strength which a pipe weld should possess. On the other hand, the joint may be built up unnecessarily, making an entirely too heavy and wasteful joint. A joint in which the weld is built up just slightly above the thickness of the pipe is the joint which the operator should aim to make. Such a weld will equal, if not exceed, the tensile strength of the pipe itself.

Cost Data

An 8-inch turning welded joint may be made in some instances in twenty minutes, or it may take as long as thirty-five minutes, and yet there would be no difference in strength or in its quality as a gas tight joint. This difference of time may be caused either by the chamfer on the ends of the pipe being very uneven, or possibly due to one or the other of the ends of the pipe which is being welded, having for a portion of its circumference an extra thickness of metal.

Considering an average joint, and taking into consideration only the actual time necessary to make it, the cost will be:

Labor (including operator and helper)	$0.23
Acetylene	.38
Oxygen	.42
Filling iron	.07
Total cost per joint	$1.10

or a total cost per foot of pipe laid (20-ft. lengths) of 5.5 cents.

The above cost is only for the actual time found necessary to make the joint. It will be obvious that in order to arrive at a more clear understanding of the cost of the weld, the full cost or the time of the operator and helper in other work, such as setting the pipe for the joint, changing tanks, etc., necessary in connection with the actual welding, should be added. This additional charge will increase the labor cost from 23 cents to 41 cents, making the total cost of the joint $1.28, and the cost per foot of main laid, 6.4 cents.

Still further considering the cost in addition to the labor cost necessary for the actual welding, add the labor cost found necessary when laying a main of the size being considered (8 in.): to place the pipe in position for the welder and helper it will be found that there will be an additional labor cost of 18 cents per joint, making the total cost of the joint $1.47, or a cost per foot of main laid of 7.3 cents.

The above costs were calculated from 327 joints made by three welders working ahead of the ditch.

Considering now the ditch and stationary joints, we would find if the maximum cost of these were taken, that in some instances they would be as high as three times that of the turning joint, depending upon the condition under which it is found necessary for the operator to work. Considering the ditch joint, we find that the average cost will be about as follows:

Labor	$0.45
Acetylene	1.06
Oxygen	1.20
Filling iron	.10
Total cost per joint	$2.81

The stationary joint will be found to cost somewhat less than the above and will average about as follows:

Labor	$0.30
Acetylene	.84
Oxygen	.96
Filling iron	.10
Total cost per joint	$2.20

From a careful study of these figures it will be at once apparent that every effort should be made to avoid these latter joints, as already shown, whenever possible. The joint in the ditch should only be resorted to when an obstruction compels its use. It will be found in the case of the stationary joint that an average of about fourteen will be required for each mile of main laid. If good judgment is used and these expensive joints kept to a minimum, the average cost per joint or per foot of main laid will only be slightly increased.

Twenty- Versus Forty-Foot Lengths

Some engineers have thought that the extra cost of labor for handling the 40-ft. lengths of pipe would more than offset any saving which might be effected due to the reduction in the number of joints made per foot of main laid.

In order to arrive at an intelligent understanding on this subject, the average cost of 128 joints or practically a mile of 8-in. main, using 40-ft. lengths, was calculated. The average cost, including all labor necessary, in addition to the operator and helper, for shifting the pipe ahead of the welders, showed as follows:

Labor	$0.95
Acetylene	.38
Oxygen	.42
Welding iron	.07
Total cost per joint	$1.82
Total cost per foot of pipe laid	$0.045

Thus it will be seen by a reference to the maximum cost of a joint made when using 20-ft. lengths under the same conditions, the cost will be 35 cents less than the joint of the 40-ft. lengths, but that the latter has a much less cost per foot of main laid, the difference in favor of the long lengths being 2.8 cents. These figures, however, do not take into account the possible extra cost due to cartage, which would probably decrease the difference per foot in favor of the 40-ft. lengths to about 2.3 cents.

The foregoing analyses of cost being all for 8-in. joints, it might be of interest to have, as a guide in order to arrive at the cost of mains of sizes from 1½ in. up, the actual cost of making the joints in the smaller sized pipe.

The accompanying table shows these costs arrived at from tests made on joints from 1½ in. to 3 in. The actual time to make 4-in. and 6-in. joints would be about 14 and 20 minutes, respectively; and the cost would be about 55 cents for the 4-in. and 70 cents for the 6-in.

Cost to Weld Joints

Test No.	Size of pipe	Size of tip	Time to make weld	Acetylene consumed	Oxegen condensed	Filling iron used	Cost of weld
1	1½"	6	3 minutes	1.25 cu.ft.	1.5 cu.ft.	0.9 ounces	$0.08
2	1½"	6	2 "	1.0 " "	1.0 " "	0.8 "	0.06
3	2"	6	5 "	2.0 " "	2.25 " "	1.1 "	0.13
4	2"	6	3 "	1.25 " "	1.5 " "	1.0 "	0.10
5	3"	6	7½ "	3.0 " "	2.5 " "	2.45 "	0 19

These tests show only the cost of labor actually required to make the joint, the costs, including all other necessary labor in connection with the weld, will be governed by the efficiency of the organization.

Connecting Long Sections of Pipe

The pipe having been put together in long sections by making turning joints, it then becomes necessary to bring the sections of pipe—which in some instances may be 500 ft. long—together in order that they may be jointed to make the continuous main.

This may be accomplished by either one of two ways, namely by shifting the pipe on rollers or by having each one of the sections, as put together, to slightly overlap, and cut off the portion of pipe which overlaps and then bring together and weld.

This latter method of bringing the ends of the long sections of pipe together will require no shifting of the pipe and will, therefore, require a minimum of labor. The pipe which is to be cut off should be marked very accurately around the full circumference of the pipe with something which will make a distinct line in order that the operator may be guided when cutting the pipe. An 8-in. pipe can be cut with the cutting torch in from two to three minutes, and will, by following the line marked on the pipe, be as straight as could be made in any other way.

The method of shifting either backward or forward can be done by the employment of rollers mounted on blocks. The pipe being placed on the rollers can be very readily shifted by attaching an automobile to the pipe by means of a rope.

Making Connection to Existing Main Line When Valve Leaks

It many times develops when making a connection to an existing gas main for a continuation of the same, that the valve will be found leaking, thus making what would appear to be a con-

dition which would make a welded joint for the connection impossible.

The work under this condition may be made a comparatively easy and safe undertaking by a method which consists in nothing more or less than the bagging of the main and tapping it between the point of the bags and valve and extending therefrom a bleeder above the ditch, in order that the gas leaking through the valve may be carried off and thus be kept at a pressure which the bags will withstand. This is a very simple and efficient method and has been very successfully used in overcoming this difficulty, not only for new main work, but for repairs when it is found necessary to shut off the gas.

Flanges

The companion flanges for connecting the valves in a main should be welded to short pieces or lengths of pipe in advance of the actual main work.

Flanges may be made by the use of the machine cutting torch, with circular attachment, for any size pipe and will be considerably cheaper than the ordinary extra heavy forged steel flange. When the flanges are cut from plate the opening should be cut sufficiently large to just allow the pipe to slip in.

To weld the flange to the pipe the pipe should be slipped in the opening just far enough that the pipe will not come to the face of the flange, and peened. The two to be then welded with the weld of sufficient strength to withstand any contraction strain which may take place at these points. When the flanges used are made from steel plate there will be no difficulty experienced with those of sizes up to and including 4 in. For sizes larger, however, difficulty may be experienced owing to the possibility of the flanges being slightly warped, due to the heat from the torch. Before sending these flanges out to be used they should be very carefully inspected, and, if found necessary, be refaced in order to avoid any difficulty from this source. If the extra heavy forged steel flanges are used, the same difficulty may be experienced from warping as the result of the heat, and the same precautions should be taken to avoid trouble.

Another precaution to be observed if the threaded forged steel flange is to be used, is that the weld should be made to entirely cover the threads in the pipe and thus bring the pipe at the point of the weld to the full tensile strength of the pipe.

The cost of the flanges cut from steel plate, using an 8-in. size for comparison, would be, for all labor and material, about $4.75 against $7.00 for the forged steel.

Making a Lateral Connection

When oxy-acetylene welding was first proven to be a success for gas main joints, it was not thought possible that a connection could be made for a lateral main only at such time when the new main was being laid; also that all connections should be provided at any point where a lateral main would be required of any size from 2 in. up, and for the small sizes using a saddle and cock and tapping through the cock at the time lateral connection was required.

However, with the better understanding of the possibilities of oxy-acetylene welding, and having proven that a connection could be made with any pressure of gas maintained in the main, the necessity for providing any such lateral connections was seen to be unnecessary. In order to make the connections, made under pressure, entirely satisfactory, it was found necessary to have a drilling machine constructed which would drill the main for any size opening up to 3 in. in diameter.

All that is necessary in making a connection under pressure is to weld to one main a short piece of pipe of the proper size, to which a flange has been previously welded. To the flange thus provided, attach the valve. To the outlet of the valve attach a suitable connection in order that the joint at the main may be tested. After testing and proving that the joint is tight, drill the main through the valve. After the main has been drilled draw the drill past the valve gate, close valve, and remove the drill and drilling machine from the valve.

Services

In high pressure service work the greatest trouble experienced has always been at the connection to the main. The connection, which has generally been accepted as good practice, has been the one made with a saddle, corporation cock, and swing joint. The weak points in this style connection are the saddle and the great number of threaded joints required.

When oxy-acetylene welding first became the practice in main work it was at first thought that the only time that a service connection could be welded to the main would be those made to a new main in advance of the gas being turned on. It was not long, however, before it was proven that the service connection could be made with absolute safety to any existing main regardless of the gas pressure.

When the fact was established that service connections could be welded under any pressure conditions, it was seen that the saddle could be entirely dispensed with. Later, it was suggested as a further step in the direction of an absolutely leak proof connection free from the possibility of any future trouble, to use a welded tee piece, thus reducing the threaded joints to one.

The manner of making this connection is to first weld the connection to the main, extend the service to the curb and set the curb cock, which should be left open. Drill the main through the tee piece with a ¼-in. drill; remove the drill and screw the cap on the open end of tee, and close curb cock. The curb cock is left open in order that the gas may pass out through the service pipe, thus enabling the cap to be screwed on the tee with comparative ease and safety.

The comparative cost of the welded connection with that of the connection when made with a saddle and cock, and with the saddle when no cock is used, are shown in the following table:

Table II—Relation Cost of Service Connections

Size	1¼″	1½″	2″	2½″	3″	3½″	4″	6″	7″	8″	10″
Welded	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55	.55
Saddle without cock	.42	.45	.47	.49	.51	.64	.66	.79	1.05	1.11	1.67
Saddle with cock	.87	.90	.92	.94	.96	1.09	1.11	1.24	1.50	1.56	2.12

By an examination of the table it will be seen that the cost of the saddle connection rises rapidly with each increase in the size of the main.

Shop Work.

The use of oxy-acetylene welding in shop work has proven to be of greatest assistance in the work of the distribution department. By its use many repairs are made which would otherwise be impossible; many times by its use, some apparatus—such as a special burner—is made better and more economical than by any other way. But in no way does the value of the welding torch show to better advantage in shop work than in this, of preparing material for a proposed main extension, or in fact, for any work for which material may be prepared in advance.

For any proposed main all the drips may be made and tested in the shop, and likewise, all the companion flange pieces may also be prepared in advance of the actual work in the field. When it is considered that one 8-in. drip will require as much welding as about five 8-in. joints, the saving of time when laying the main will be thoroughly appreciated.

Oxy-acetylene welding in repair work has been least understood, and as far as the writer knows, has never been treated in any paper on welding in this country, although the field for its use in this way is practically unlimited, with new ideas being suggested almost daily.

Welding in repair work requires more skill and more careful supervision, and offers a much wider field of opportunity for usefulness than in any other line of work in which it is employed, thus making it a subject of more than ordinary interest. The knowledge also that the repair when made will be an absolutely satisfactory one, and as permanently leak proof as the main itself, makes this mode of repair of the greatest satisfaction.

Patching a Leaking Gas Main

Many leaks develop in gas mains caused by electrolysis. Such a leak will generally show in the body of the pipe in the nature of pits. It has been the custom to repair such leaks by placing a blank saddle over the part of the main affected. It was suggested, however, that such a leak would be repaired better and with most lasting results by welding a patch of new metal over the part of the main affected.

To make a repair of this nature a lever should be attached to the gas main by a removable clamp of any design. To the resistance arm of the lever is attached a loose rod, which in turn is attached to the patch to be welded on by means of slight welds, or in any other manner so that it may be brought down firmly on the point of the main to be repaired. To the underside of the patch, in order that the leak will be entirely stopped while welding, wet asbestos wick or sheet asbestos should be attached. When the patch is brought down on the leak, the lever should be wedged in place in order to hold it firmly while the weld is being made.

Luring Consumers to the Gas Office

When a particularly understanding man reviewed the situation in his own office out in Everett, Wash., he discovered that the various gas appliances there on display were not receiving the attention of the town's best buyers. These people were not coming into the gas office, for they were paying for the service delivered to them through pipes, by checks sent via the mails.

These were customers whose financial standing would make them ready buyers of the most convenient and up-to-date forms of appliances; the newest ranges, the most efficient water-heaters and laundry apparatus as well as the various kitchen and dining room conveniences would naturally find a place in their domestic equipment, if these things could be so presented to them as to make a favorable impression. The display at the gas office was intended for this purpose but was failing because these people did not visit it. Since it was impossible to take the display to the customers, it became necessary to bring the customer to the display. But customers cannot be driven into an office. Nor did the direct method of inviting them to see the ranges and water-heaters seem to promise much.

At this point the suggestion was made and carried out, that a part of the office space, including one show window, be offered each Saturday to some local church or charity organization for holding sales of food stuffs. Manager Coffy, writing of the plan says:

"Since starting this five weeks ago there has been a sale every Saturday with from two to eight women in attendance besides the number of buyers who come through advertising given the sale by the press and pulpit. Through this means we are getting people in our office who have not been there for years and once they are in they will almost invariably look over the various appliances we have on display.

"An excellent example of the value of these sales occurred when the ladies of Trinity Episcopal Church held a sale of hot cross buns for Good Friday. One of the members of the congregation came in with her husband and almost before making her purchase of buns she became enthusiastic over a $40 range with enamel trimmings and glass oven doors.

"These people were in the office but a short time, but before leaving they signed an application order for the range.

"Besides the value of this plan as a sale stimulator it is also of extreme value in securing the good-will of all those with whom we thus have a chance to come in contact. It has been somewhat difficult to get this started as the churches could not understand why we were willing to do so much for them. At the present time we believe that as soon as the churches understand the proposition we will have the space engaged for weeks ahead. In addition to giving such space as is needed for the sale, we connect a gas range in the windows for the cooking and donate the gas required."—*From the Monthly Bulletin of the National Commercial Gas Association.*

Motor Cycles with Side-Cars Expedite On And Off Work in Cincinnati

Not Only Does Side Car Serve to Carry Tools, but It Has Wholesome Effect on Drivers in Minimizing Reckless Driving—Men Do Their Own Repairing

By FELIX J. KOCH

In these days when Greater Cincinnati not only lights with gas, but heats and cooks with it almost exclusively, the matter of getting meters "turned on," so that folk may begin consuming gas at once, and of turning them off, ere the defaulting, or others, get the "better" of the company, are important features, indeed.

To this end the Union Gas & Electric Company maintains a fleet of motor-cycles, apportioned among the on-and-off men.

In addition every one of these are equipped with side-cars, these being used, primarily, for carrying tools and occasionally an extra gas-meter. Not only does the side-car thus permit of use as a cart or wagon, but more important still, it prevents damage suits. It has been found that there are far and away less accidents, that they tend to reduce the number of accidents both to pedestrians and through drivers filled with the zest of speeding, crashing into unexpected obstacles.

The men on the motor-cycles work a nine-hour day. Each man is given complete charge of his cycle and makes his own repairs. The company finds it cheaper and better to do this than to run its own repair shop, or contract with some garage for repairs. The men are more careful when they must do their own repairing and need of such isn't nearly as likely to occur.

The motor-cycles are not spared in the work. Each man covers a minimum of 350 miles a week. It is not permitted to use the cycles for private ends on Saturday half-holidays or the Sabbath, and so these totals represent actual mileage on company trips.

Sixty miles a day, on a motor-cycle, regularly, may not mean so much to a layman, but it's quite a ways, when considered in the light of the work which it represents. On those 60 miles the man will make some forty-five stops at least.

Most of these are for turning on the meters, or for turning off. If, however, several complaints on "service" be in for the route over which the man is bound, he attends to these; or, again, he, also, is detailed on such route to set a meter. In certain sparsely-settled districts in the environs of town, where a meter is set only once or twice a week, this task is delegated to the motor-cycle man. The men are paid by the week and so'd as lief do this as any other thing.

Rides on the cycles extend, as a rule, some 14 miles from the starting point, but on these rides, every section of the towns about is involved. All kinds of work, too, may be presented and so for the side-car, a tool-chest has been built with handles to make it easy to carry into the house.

For hurried jobs the motor-cycles are used, as well; for example, it is a stand-by when call comes for leaks, or in event of a fire-alarm.

Industry Needs a Flexible Tubing in Which it Will be Safe to Allow the Gas Pressure to Remain at All Times

Must be Sufficiently Flexible to Hang in Graceful Natural Curve and Non-Crushable Under Heel of Person of Ordinary Weight—If All Outer Coverings Are Burned Off Metal Base Should Be Able to Prevent Serious Leakage

A standard specification of flexible tubing, describing the composition and construction in detail, is demanded by the gas industry, stated the report of the Committee on Utilization of Gas Fuel Appliances, of which W. J. Serril is chairman, which was present at the recent annual convention of the American Gas Institute. Increasing agitation in the cause of safety, the imposition of ever stricter requirements by fire prevention authorities, and a proper regard for the essential interests of the industry call for the production of a flexible tubing that shall be substantially as safe as a rigid metal pipe. A tubing is needed in which it is safe to allow the gas pressure to remain at all times.

To meet the requirements, the tubing must be sufficiently flexible to hang in a graceful natural curve, to maintain its flexibility unchanged throughout its life, to be non-crushable under the heel of a person of ordinary weight, to be non-breakable and gas-tight when subjected to extreme bending, to be non-combustible, in the sense that if all the outer coverings are burned off, the metal base of the tubing still will retain its form, and the leaking gas will be so small in volume that the flames at 3-in. pressure will not be over 1½ in. long, which, if caused to leak by mechanical injury, or by fire, should develop only small, non-dangerous leaks, so long as the tubing maintains its form, that will not absorb the moisture from the atmosphere, and, if uninjured, which will remain gas-tight indefinitely, and will permit of the attachment of metal ends in such a way that they cannot be pulled off.

Tentative Specification Offered

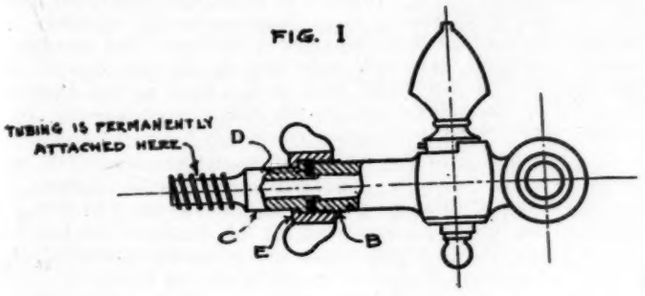
The following tentative was offered by the committee with the comment that, in its opinion, it would provide a tubing that will meet the above requirements:

The tubing to be capable of withstanding, without crushing, a load of 100 lb. per running inch, and to be capable of withstanding, without rupturing, a steady load of 75 lb. When subjected to a twisting moment, acting either clockwise or counter-clockwise, to be capable of withstanding, without rupture, an angular de-

flection of 180 deg. per lineal foot. The inside diameter of tubing to be $\frac{3}{16}$ in., $\frac{5}{16}$ in., $\frac{3}{8}$ in., or other sizes, as need may develop. The outside diameter to be no larger than necessary to comply with the requirements of the specification. The maximum outside overall diameter to be $\frac{7}{16}$ in. for the $\frac{3}{16}$-in. tubing, $\frac{9}{16}$ in. for the $\frac{5}{16}$-in. tubing, and $\frac{5}{8}$ in. for the $\frac{3}{8}$-in. tubing. A variation of $\frac{1}{32}$ in. from these dimensions is allowable.

A one-foot length of $\frac{3}{16}$-in., $\frac{5}{16}$-in. or $\frac{3}{8}$-in. tubing, when held horizontally at one end, should have a drop of at least 45 deg.. this angle being measured between the horizontal axis of the point of support and a line connecting the point of support with the free end of the tubing. Either $\frac{3}{16}$-in. or $\frac{5}{16}$-in. tubing to be capable of withstanding, without rupture, the strain produced by bending the tubing into a circle of 2 in. mean diameter. Three-eighth inch tubing to be capable of withstanding, without rupture, the strain produced by bending the tubing into a circle of 3 in. mean diameter.

FIG. 1



A 6-ft. length of $\frac{3}{16}$-in. tubing. equipped with the specified rubber slip ends, or with the specified metal ends, secured in the specified manner, shall not show a pressure loss in excess of four-tenths inches of water, when passing gas of 0.6 specific gravity at the rate of 5 cu. ft. per hour.

Similarly, a 6-ft. length of $\frac{5}{16}$-in. tubing shall not show a pressure loss in excess of one and one-tenth inches of water, when passing gas at the rate of 30 cu. ft. per hour.

A 6-ft. length of $\frac{3}{8}$-in. tubing shall not show a pressure loss in excess of three tenths inch of water, when passing gas at the rate of 30 cu. ft. per hour.

A 6-ft. length of tubing, when connected up to the outlet of a gas meter graduated to read to 1/100 of a cubic foot, and subjected to a gas pressure of at least six inches of water, shall show no leakage over a 15-minute period.

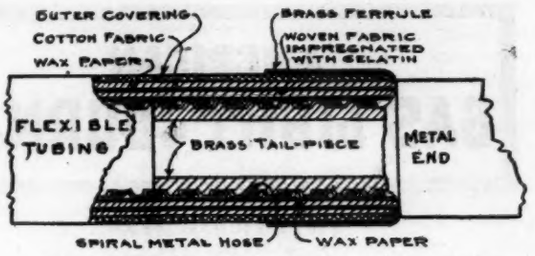
The tubing to consist of the following component parts which are given in their order from the inside to the outside of the tubing: Rubber packed metallic core, waxed paper wrapping. braided cotton fabric sheath, impregnated and coated on one side only with a gas-proof and gas-tight compound, waxed paper wrapping, braided cotton covering, and silk, silkaline or cotton-finish covering.

The metallic core to be formed of one unbroken strip of metal, wound spirally with an interlocking seam and made gas-tight by a continuous rubber thread-like gasket.

The waxed paper to be of such grade and width and so wound that it will form a covering impervious to moisture when the tubing is subjected to specified bending tests.

The woven cotton fabric to be of such a character as to absorb and hold securely the specified quantity of the compound. The compound to be of such composition that it will not soften to a sufficient extent to ooze through the waxed paper wrapping when the tubing is subjected for a period of 48 hours to an atmosphere of 100 deg. Fahr. and 100 per cent humidity; and that, when subjected for 48 hours to an atmosphere at 0 deg. Fahr., it shall not crack or lose its gas-tight property when subjected to the tests for bending. A sufficient quantity of the compound to be used to ensure a thickness of the impregnated and coated cotton fabric of not less than $\frac{1}{32}$ in. or more than $\frac{3}{64}$ in.

FIG. 2



CONNECTION TO INDEPENDENT COCK

The cotton covering, if dyed, to be dyed with *fast* color, preferably to match color of finish covering or of some neutral tint, and of such a texture to protect properly the paper from abrasion.

The finish covering to be furnished as ordered; to be dyed with *fast* color.

The metal end connections to be attached to the tubing as shown in the accompanying illustrations.

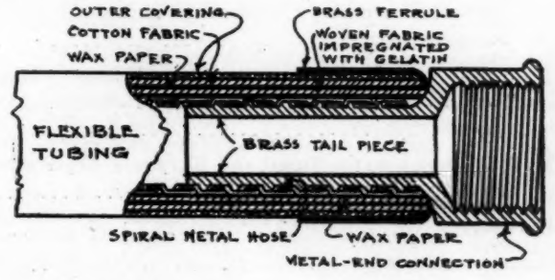
The nozzle end (B) of an independent cock is threaded, and its face finished, so as to form a seat for a washer joint. The washer is attached to a metal end (C). A wing nut (E), which slides on the metal end (C) and which is tightened by the fingers, serves to secure the metal end to the independent cock, and to make the joint tight. The tail piece of the metal end (C) is spirally corrugated for attachment to the standard tubing described, as shown in detail in Fig. 2.

The tail piece of the metal-end is corrugated to fit the spirals of the metal base of the tubing. The tail-piece is coated with glue and screwed into the tubing. The glue hardens and serves to ensure gas-tightness. Before the metal-end is screwed in, a brass ferrule is slipped over the end of the tubing, and is held in place by the shoulder on the metal-end after it is screwed home. The ferrule imparts neatness to the connection.

Not Good Practice to Leave Gas in Tubing at All Times

The spiral metal base gives the required strength, flexibility, non-collapsibility, non-combustibility and security of attachment for the metal ends; the composition coating lends the desired gas-tightness and uniformity in elasticity and plasticity; the two

FIG. 3



CONNECTION TO APPLIANCE

wrappings of oiled paper protect the elastic coating from mechanical abrasion and from the moisture of the atmosphere; and the woven outer covering contributes the good looks.

But, it will be asked, no matter how perfect the tubing may be in itself, will it ever be good practice to arrange for leaving the gas in the tubing at all times, so long as it is connected at its two ends, or at either of them, by the slip joint? The committee thinks not. When the slip joint is used, no cock should be permitted at the consumption end of the tubing. Several years ago, the committee took a decided stand in opposition to the slip joint, and said that it hoped for its ultimate abolition. Its position has in no whit changed. It still believes it to be for the interest of the industry that an acceptable substitute be found.

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Protests Against Samuel Insull's Estimate of Gas Man

Elsewhere in this issue we print a letter from S. E. DeFrese, general manager of the Chattanooga Gas Company, and a director of the American Gas Institute, in which he protests against the estimate of the gas man made by Samuel Insull at the banquet at the recent annual convention of the American Gas Institute at Chicago.

Though affiliated with gas interests, Mr. Insull, as Mr. DeFrese states, is not essentially a gas man. In fact he has won himself an enviable place in the electrical industry. Yet this journal cannot but believe that, deep down in his heart, Mr. Insull has only the warmest feelings of friendship for the gas industry, and cherishes not the slightest doubts as to its future greatness.

The first of these beliefs is confirmed by the fact that he bearded the lion in his den, so to speak, to rouse him to greater efforts.

The latter assumption must be taken for granted since it is generally known that Mr. Insull is an exceedingly intelligent man, and has won prominence in many instances through his ability to forecast the future. With the signs of the times that are everywhere in evidence, none can doubt that the greatest days of the gas industry are still ahead, even though they, as Mr. DeFrese expresses it, "read electrically, eat electrically, make speeches electrically, and strive for *everything* electrically."

It is not unnatural that Mr. Insull should be mistaken in his estimate of the gas man. The argument as to his abilities or energies is one of those the gas man has allowed to go by default, not even considering his reputation in this regard, so long as he was attaining the excellent results he undoubtedly has attained, a factor of sufficient moment to be worth arguing about.

In this regard it has been somewhat like the secretary of an impulsive president of some years ago. Every criticism-provoking utterance that was made, every seemingly headstrong act that was performed, was credited by the public to this secretary. One who was inclined to judge things superficially would have had good grounds for estimating this man as a somewhat incompetent bungler.

But the business men of the country do not judge thus superficially. When that man re-entered private life, his services and talents were very much in demand. At the present writing we have lost track of him, but we know this much: that he is still doing tolerably well.

So it has been with the gas man. Everywhere, outside of his own industry, and in some cases in it, he has been advertised as uneducated, uncouth, and, worse than all, lacking in industry and ambition.

Yet from a small beginning the gas industry has grown to large proportions; not at so rapid a rate—it is conceded—as the electrical industry, but at a rate sufficiently rapid to justify those engaged in it to feel eminently satisfied with what they have attained. And big things are not accomplished by little men.

We do not agree that Mr. DeFrese should ask his fellow directors in the Gas Institute to express their displeasure at Mr. Insull's utterances. On the contrary we believe he should ask them to thank him for his frank and, we might add, bold expression of his opinions before an audience that must, by the nature of things, have been hostile. We firmly believe that Mr. Insull entered that banquet room with a firm resolve to do a service to the gas industry.

If others were affected as Mr. DeFrese's letter indicates he was, we also believe that Mr. Insull succeeded in his purpose.

Mr. DeFrese indicates quite plainly that he did not concur in Mr. Insull's opinion of the gas man. Neither does the AMERICAN GAS LIGHT JOURNAL.

Yet Mr. DeFrese unquestionably was goaded to a point where he might quite naturally have given vent to his feelings in the expression: "I'll show him something."

It is quite natural, too, to expect that the electrical interests in Chattanooga, and vicinity, will be subjected to somewhat stiffer competition in the near future than they have in the past; due merely to the effect of Mr. Insull's address. It does one good at times to have the abilities of his kind unwarrantably condemned.

The AMERICAN GAS LIGHT JOURNAL, figuratively speaking, chuckles up its sleeve every time someone casts aspersions on

the personnel of the gas industry. It would do so itself, occasionally, if it could do so honestly.

But, after an acquaintance of somewhat over a half-century, this journal could not plead ignorance of the gas man's personality and ability. It must therefore sit quietly back, hoping that others less well informed will do this truly useful work. For a useful work it is, extending as it does the use of gas. An appeal to a man's pride is usually productive of results. And even one but slightly sensitive is likely to be aroused to unusual activity by criticisms, he believes unjust, uttered against his kind.

Lengthiness in Association Papers

Comment has been made previously in these columns of the unusual degree of valuable information that has been presented in papers at recent meetings of various gas associations. Had it all been absorbed, by those in attendance, to the degree it merited, a truly important result would have been accomplished. Frankly speaking, this journal does not think it was absorbed to such a degree.

The reason is that men have progressed beyond the point where they can give undivided attention to lengthy discussions. This is not their fault or due to any mental shortcomings. It is due rather to the influence of their daily environment.

The lessons that are read or listened to in these times are the lessons that are expressed, wherever possible, in short, but complete sections, and which waste no words in reaching the point. The time is past when a man could sit down with the intention of devoting a stated period to the reading of his technical journal or his copy of the proceedings of his association. In the days when emergency calls came by messenger, and he generally was afoot, or on, or behind, a horse, instead of by telephone, such a program could be carried through. Nowadays it is impossible. There are too many interruptions.

Nine out of ten men, when they pick up a periodical, hastily glance through it until they come across a particularly brief story or article. If the caption attracts their interest it is probable that they will stop to read. They know that it will take them but a matter of minutes to run through it and feel reasonably sure of finishing it before the unexpected, yet already discounted, interruption comes. The longer articles or stories, it is true, will not be entirely ignored, but, assuming that their captions have also aroused their interest, will be marked mentally for future reading when the time is available. In the meantime other articles come to the attention, and the periodical first opened goes lower and lower in the pile on the table. The chances are greatly in favor of this periodical's going into the waste basket with the articles, already listed for reading, still unread.

When the gas man goes to a convention he goes with the intention of listening to the papers and absorbing the lessons therein. And he honestly thinks he will. He knows the convention is the only business he has in hand and that he is far away from his customary interruptions and emergency calls. But he cannot change in a day the mental habits he has formed in a year. He listens attentively, perhaps, through the first half hour of the long paper. Then his mind begins to grow restless. The usual interruption has not come, but the mental habit is still potent. His mind has been schooled to divert itself in an instant, after a certain period, to an entirely different trend of thought and it cannot overcome the tendency to do so in this particular instance.

He can compel his mind to follow the paper after the point it instinctively diverts, but it is an effort of the will—in other words, work. When the session is finished he goes away with an unsatisfied feeling. He realizes there is much that he has lost. His natural impulse is to blame himself. In justice the blame should rest with the man who prepared the paper.

"But," objects the dissenter, "if there are many factors that effect vitally the subject under discussion, should these factors be sacrificed to make a pleasing, though less valuable contribution to the knowledge of the industry?" By no means. Not one factor should or need be ignored. It is a question of method rather than of matter.

In this issue we publish an abstract of one of the lengthy papers presented at Chicago. It is, as the word implies, truly an abstract. It is not the complete paper by any means. Yet it falls within the class this journal would style lengthy. Should it have been pointed out to the author that he would have secured a better effect had his paper been shorter, doubtless he would have asserted emphatically that all the features discussed were absolutely essential to a proper comprehension of the subject and therefore relevant.

He could claim, and with reason, that the paper throughout was of unusual interest. In this we would have to concur. He could declare that the listener who drowsed through even a small part of the paper would have lost many suggestions of undoubted value. In this we would also have to agree.

Yet had the author canvassed the opinions of his auditors after the paper had been read, he would have found few who had gotten out of the whole of it anything more than a very general impression. He would have found, however, in various men's minds a very vivid impression of this or that idea that was dealt with. Each of the many present would have absorbed that part of the whole, which, for this reason or another, directly appealed to his interest.

This tendency of the mind of the modern gas man suggests the remedy for the condition. The American Gas Light Journal is strongly of the opinion that the gas industry does not use its journals to the best advantage. In them it has a medium published at regular intervals throughout the year—in the case of this particular journal a weekly medium—for the interchange of thought.

How much more thoroughly could the author of the paper we have in mind have impressed the suggestions of unquestioned value contained in his discussion upon the industry by use of the following method:

The various subdivisions in the paper should have been the basis of individual articles offered for publication to some gas journal. The general scheme of this class of work carried out by his company would then have become common knowledge. The shortness of the articles would have been almost an assurance that they would have been read.

Then, when it came to convention time, he could have confined himself entirely to pointing out the advantages of the system and indicating its points of difference to the methods followed by other companies. This would have been ample to accomplish what, after all, is the primary object of any paper presented at an association meeting; namely, to arouse discussion. Undoubtedly, too, this latter feature would have been given an enhanced value in that those taking the floor would be talking on a practice that they already had been made familiar with, not on something that had just been flashed before their minds. And, above all, brevity would have been attained.

Those who prepare papers for association meetings do a great deal of work, the extent of which is not always altogether appreciated. They can have but one motive in mind. That is good will towards their fellows.

They desire to impart to other workers in the industry some knowledge or suggestion upon which they are particularly qualified to speak. Their only possible reward can be the consciousness of a task well done. They cannot feel this unless they know that the facts or ideas they have sought to convey are absorbed to the greatest possible degree.

For this reason this journal recommends that all those who have prepared papers for such purposes or are contemplating the preparation of papers to be presented at future conventions will thoroughly consider the suggestions we offer.

Men are not going to cease seeking and absorbing information merely because they have to work to get it. In past times sick men did not altogether refuse medicine because it tasted bad. But to-day the sick man, as between the physician who prescribes medicine that is nasty to the taste and the physician who is inclined towards the sugar-coated variety, is certain to choose the latter; that is, of course, providing such medicine is equally, or almost, as effective.

The same thing applies to the dissemination of knowledge. Modern journalism has devised methods of presenting facts in a manner that makes them more attractive to the eye, and more easily absorbed than was the case even as late as a decade ago. The man who contemplates the labors of preparing a paper for an association convention owes it to himself to do the little additional work necessary to inform himself in regard to the best method of conveying his facts or ideas in the most effective manner.

Publications

PROCEEDINGS OF THE NATURAL GAS ASSOCIATION OF AMERICA: A detailed account of the doings of association is given in a very interesting style, in regular order as they occurred during May 16, 17 and 18, and includes reports on all of the many committees. The several addresses as were given by the various officers are set down by the secretary. The following are the papers which were read; each by its author: The Conservation of Natural Gas, Dr. Van H. Manning; Group Life Insurance, Lawrence C. Woods; Welding In Gas Main Construction, F. L. Hadley; New Business for Natural Gas Companies and How to Obtain It, Henry O. Loebell; Value of Leaseholds for Rate Making Purposes, H. C. Reeser; Measurement of High Pressure Gas, W. F. Schell; Rules for Natural Gas Service, Edwin Robinson; Extraction of Gasoline from Natural Gas by Absorption Methods, Messrs. George A. Burrell, P. McDonald Biddison and George G. Oberfell. The "Wrinkle Department" report makes up a very valuable portion of the book as there is given over 150 "wrinkles," each one of which are useful.

RECORDING & INDEX THERMOMETERS.—Stiff-paper backed booklet issued by the H & M Division of the Taylor Instrument Companies of Rochester, N. Y., indicating special features of the Tycos recording and index thermometers, and describing their construction and uses.

H & M THERMOMETERS FOR GAS WORKS.—Paper-backed booklet; 48 pages; illustrated, issued by H & M Division of the Taylor Instrument Companies of Rochester, N. Y. Discusses thermometers and gauges for gas works, by-product coke ovens, steam generating plants, and ammonia and tar distilling. An unusually attractive booklet and excellently illustrated; the two-color view of the Féry radiation pyrometer being used to measure temperature of gas retorts standing out with special prominence.

THE VULCAN BULLETIN FOR SEPTEMBER.—Contains article on "The Test That Determines the Baking Qualities of a Gas Oven." Issued by the Wm. M. Crane Company of New York City.

DO YOU WASTE EXPLOSIVES?—Folder, issued by E. I. du Pont de Nemours & Company, of Wilmington, Del., pointing out the economic advantages of having every bore hole solidly tamped to the mouth, and of the use of the company's tamping bags for the purpose.

THE NITRATION OF TOLUENE, by E. J. Hoffman, has just been issued as Technical Paper 146, by the U. S. Bureau of Mines. This paper is the result of experiments made in the explosives laboratory of the Bureau of Mines on the preparation of trinitrotoluene from toluene obtained in the manufacture of water gas. A brief outline of the theory of toluene nitration and a review of technical methods for the manufacture of trinitrotoluene are given. The experimental part includes a comparison of several different procedures for obtaining the desired product and the investigation of the effect of varying proportions and concentrations of nitrating acids and the influence of the temperature of nitration on the yield and quality of product. As a result of the experiments a method is outlined which the author believes will give the best results in the preparation of trinitrotoluene.

UNDERGROUND WASTES IN OIL AND GAS FIELDS, AND METHODS OF PREVENTION is the title of Technical Paper 130, just issued by the U. S. Bureau of Mines. The authors, William F. McMurray and James O. Lewis, in introducing their subject, define underground waste as the "unnecessary destruction or lessening of the value of underground supplies of oil, natural gas, and potable water." The authors state further that, "the maximum usefulness could be derived from a pool of oil or gas by its being controlled by one competent management, as under such conditions it could be developed with the least waste and at the smallest cost. However, rarely is a pool under one control; ordinarily a pool is divided among many owners. To get the best results the operators should act in unison for the protection of their common sources of supply, and for their mutual benefit. To make co-operation among the producers in a field effective, it seems necessary for them to organize with some central authority that can furnish protection against careless, inefficient, or even deliberately negligent acts of individuals. The center of this organization should be supplied with all the data effecting the common interests, which could be kept confidential if necessary, and from this information concerning conditions in the field, general policies for development and operation could be outlined. That would work to the best interests of all concerned. There is no business to-day in which, by its very nature, there is more need for co-operation than among the oil and gas operators, yet they have been able to do practically nothing by themselves. Nearly all attempts at co-operation among oil and gas producers have failed, primarily because there was no authority to compel the observance of the will of the majority by individuals who do not choose to follow the policies laid down. In the paper the writers have endeavored to establish the manner and importance of underground waste by citing a few cases and to show the means whereby it can be prevented.

The flooding of oil deposits by water from strata above or below the producing sand is discussed, the writers stating that such flooding is avoidable and due to faulty drilling methods or other preventable causes. They say that when water first appears in a well, a careful and systematic study should be made, and the operator should never assume that the advance of water is the natural, and possibly unpreventable, invasion that marks the depletion of the field. The flooding of gas deposits by water from sands above or below the gas sand is discussed, and examples are given. The waste of gas by migration or dissipation was also investigated, and the authors in their report state that the amount of gas that can be taken up by strata commonly found in oil and gas fields is usually underestimated by operators, as there is seldom any considerable thickness or beds which does not include some porous formations. Moreover, it is said, it is a common axiom among gas producers that once a gas sand is tapped the gas must be utilized quickly because it will not remain stored, but in some manner escapes. The waste of oil by migration and dissipation is less than that of gas, as the movement of oil underground is much slower than that of gas, wastes are easier to detect and control, and oil is more closely watched by the operator. As a means of preventing underground waste of oil, gas and fresh water, the authors recommend the use of mud-laden fluid, and point out the inadequacy of packers and cement, and the mechanical impracticability of properly protecting a series of these deposits by strings of casing. Copies of this paper may be obtained free of charge by addressing the director of the Bureau of Mines, Washington, D. C.

Correspondence

Protests Against Samuel Insull's Estimate of Gas Man

Sir: I want to congratulate you on the excellent editorial "The Difference" in your columns of the 16th inst.

To every Gas Man this message of good cheer must be welcome.

I read the article before going to the Institute Meeting in Chicago and read it again to-day.

My! what a difference in the tone of this article and the speech of Mr. Samuel Insull at the Banquet, Thursday night, October 19.

This speech of Mr. Insull compels me to request that you publish this letter which is my protest on that portion of Mr. Insull's talk condemning the Gas Man for his lack of energy and relegating the gas industry to the decadent industries of the past.

Were Mr. Insull a well informed gas man I should, as a Director of the Institute, request of my associates, the adoption of a resolution requesting an apology from him, for no well informed gas man could rightfully express himself as did Mr. Insull, but Mr. Insull is an Electric Man. He probably reads Electrically, eats Electrically, also thinks and talks the same way. Therefore, why should he not make after-dinner speeches Electrically, thereby making good use of the slogan "Everything Electrically?"

I have no objection to Mr. Insull advertising Electricity, but for heaven's sake don't do this at a gas man's banquet.

Yours very truly,

S. E. DEFRESE,
General manager, Chattanooga Gas Company,
Chattanooga, Tenn.

Special English Correspondence.

Monthly Letter from Norton H. Humphrys, Salisbury, England.

British Dyes, Limited—Its Co-Operation with Other Interests in Country and with French Interests—Sales of Gas—Refilling Road Trenches—Looking After the Stray Sheep

The directors of "British Dyes, Limited," have issued a preliminary report, pending the statement of accounts for the year ending April 30, which is delayed owing to differences with the Government as to the duties payable under recent Finance Acts. This undertaking has an exceptional claim on the Government for assistance and sympathy, and it is to be hoped that the authorities will not accentuate the difficulties which the Directors have to face.

The statement as to progress is satisfactory. The invested capital amounts to $11,416,448.62, and the organization includes a committee of directors giving continuous attention to the affairs of the company; a technical committee, combining the heads of the scientific and technical departments, and a research committee under the lead of Prof. W. H. Perkins, the gentleman who, at the immature age of 18 years, originated the industry which the directors are now seeking to rehabilitate.

On account of the delay and excessive cost incidental to the erection of a central research laboratory during wartime, the research work outside the works laboratories is being conducted, for the time being, at the laboratories of different universities throughout the country, under the guidance of professors of organic chemistry. A number of assistants are engaged, and much important work is in progress. There is also an advisory council, comprising twelve eminent professors of chemistry, connected with the leading universities, in addition to the members of the technical committee. Various schemes for the encouragement of study and research in connection with the operations of the Company, are under consideration.

Co-Operation with French Interests

At the Company's works, which comprise buildings of some 25,000,000 cu. ft. content, and having a floor area equal in the aggregate to 27 acres, the supply of manufactured products is continually being advanced and increased, notwithstanding restrictions caused by the shortage of certain materials. Large quantities of raw and intermediate materials have also been sent to the Swiss manufacturers who supply the British markets.

Schemes for co-operation with all other dye manufacturers in the country are in contemplation, with the object of preventing overlapping, and the utilization of the entire resources of the country to the best advantage. The directors are also in co-operation with a commission specially appointed by the French Government, and with a company formed in France on similar lines to their own. They have agreed as to an interchange of knowledge and processes, also as to the production of intermediate products and dyes, with a view to the combination of the whole of the available skill and resources for the production of such materials on the most advantageous terms.

Some months ago, when referring to the effects of the licensing restrictions and the Daylight Saving Acts, I expressed some opinions as to the possible effect on the general consumption of gas, that have been regarded as too rosy in character. But after reading some of the statistics included in "Fields analysis of Gas Undertakings," bearing upon the sales of gas during the year ending Dec. 31, 1915, there is no occasion to alter the view then expressed, to the effect that no important diminution of output need be anticipated. As compared with the year 1913, the latest clear year previous to the war, the chief metropolitan gas undertakings—the Gas Light and Coke Company, the South Metropolitan Gas Company, and the Commercial Gas Company, show a decreased output, to the extent of 3 per cent, but the eight suburban gas companies show an increase of about 9 per cent; eleven corporation gas undertakings, and nine gas companies, covering the gas supply to our chief provincial towns, have on the average advanced nearly 7 per cent. The exceptional experience in the centre of the metropolis can be explained by the fact that the consumption is largely confined to business premises, and therefore does not get the benefit of an increased demand for cooking and other purposes, which is always experienced when the price of coal and other solid fuels is high. An important advance has also been in progress, during the last few years, in the applications of gas for technical purposes.

No Grounds for Pessimism Either as to Present or Future Prospects of British Gas Industry

Things have happened since Jan. 1. But taking the above figures into consideration together with statistics covering the first half of the current year, that have already been published, there is no ground for pessimistic forebodings, either as to the present or as to the future of the British gas industry.

The interesting discussion in the editorial columns of the American Gas Light Journal, as to efficient methods of filling trenches after laying main or service pipes, in such manner as to avoid inconvenience or danger to the road traffic, reminds one of the altered conditions, due to the introduction of motorcycles, motor cars for two up to 40 passengers, and power driven cargo vans up to ten tons weight, whereas formerly the heaviest load to be considered was that carried by four horse wagon. In the former days, the trenches were dug out and re-filled by contract and the wearing down effects of traffic were relied upon, possibly as a more effective and certainly a cheaper method of settling the trench, than the expenditure of labor for ramming down the filling. The soil was thrown in, and the surface purposely left in a hump approaching one-third of a circle in cross section. Provided that the road was well made, to begin with, and carried a sufficient thickness of solid top crust, to prevent the soft soil from spewing through to the surface, and that the macadam was kept separate from the bottom earth, this method was effective, though somewhat rough and inconvenient to the traffic. The only difficulty that arose was in small lanes or side roads, where the top crust, originally made up with cheap and inferior local flint or gravel, or perhaps nearly all worn away, was insufficient to form a solid covering on the soft earth below, and in that case the gas company had to make a good road where one did not exist before. In roads paved with granite setts or blocks, there is usually sufficient solid bedding below them to form a good foundation, and the difficulty experienced by the highway authorities in New York is unknown in our large towns.

The chief trouble, in these days of motorcycles and motors, is that fast running rubber tired and frequently studded wheels exercise a disturbing influence on a newly made up surface, that is quite different from the rolling and consolidating action of cart and horse wagon traffic. The back lash of the tired wheel seems to exert a sort of sucking, lifting, and displacing action on loose stuff, and a fragment of stone, in size equivalent to three or four inches cube, may be sufficient to upset a motorcycle. If such a casualty happens,, the gas works manager gets a visit from a partly patched and wholly exasperated individual, accompanied by a machine battered out of recognition, who demands to be mollified by the immediate payment of a very liberally priced bill for damages, and threatens all sorts of legal terrors and exposure in default.

To avoid unpleasant happenings of this sort, the hump of bygone days must be reduced to very small dimensions, if retained at all. The soil must be replaced in thin layers, and each layer thoroughly rammed, and watered if the soil is loose or dry, and does not go down under the rammer. And the top surface of the finished trench must be brought to a fairly even condition, by the aid of hard stone chippings, about one inch size, and the removal or entire burying of larger fragments. Given a competent excavation foreman, there is no special difficulty in making up a surface that will not be a source of danger or inconvenience to the traffic. As a rule, the trench is immediately opened to traffic, but under some circumstances, it must be fenced for a sufficient time to allow drying and consolidation. This is especially the case if heavy rain is experienced during the progress of the work, or within a short time after completion.

Change in Attitude Towards Consumers Who Have Been Won Away

A very general practice, in the sales department of a gas undertaking, is to strike off the list of prospects for new business, the names of parties that are users of competing utilities, or who, while formerly on the list of consumers, have fallen victims to the blandishments offered by electricians and promoters of petrol or producer gas, and have consequently ceased to be dependent on the town gas supply. But some interesting experiences recounted in the correspondence columns of the *Gas World* by A. J. Harrison, tend to support the advisability of following up and keeping an eye on the stray sheep in their new experiences, as a possibility that the representations which induced the change, are only realized to a very partial extent in actual practice.

When buying any new appliance, one frequently gets a one-sided story, confined to the advantages only. The other side of the shield, which may perhaps include defects that more than offset the benefits, is gradually unfolded in the course of every-day working. And it is this part of the story that is likely to be both interesting and capable of useful application in more ways than one, in connection with the gas sales department. After a year or two of practical experience, the customer may be doubtful as to the benefit gained by the change, and in a humour for a chat with the gas works district salesman.

Mr. Harrison, as the manager of a gas undertaking in a small district, was doing a good business with users of power, with the aid of a special discount to gas engines, of 22 per cent off the ordinary price of gas. But the agent for the Suction Power Gas plant came along, with the result that Mr. Harrison lost his best customer, and others, of course, began to take an interest in this new gas that was claimed to be so much cheaper than town gas. But on setting himself out to watch results, and to keep in touch with the actual running of the new system, he was speedily aware that many of the claims put forward by interested parties in favor of suction gas were not realized in practice. The customer decided to retain the connection with the town supply as a stand-by in case of need, and had good reason for thankfulness that he had done so. The assertion that the cost of attention and maintenance in working order was so trifling as not to be worth consideration, was found to be quite incorrect. And in these strenuous times, the fact of even a lad having idle time, might be taken as evidence of slack management.

He gathered that amongst the drawbacks against the suction plant, was the additional capital outlay required for generators and washing plant, which included a pump and overhead tank, if a high pressure water supply was not at hand. The extra cost of land thus occupied, and that required for a reserve supply of fuel, which was indispensable under present conditions, if there was to be ordinary security against stoppage for lack of fuel, was also an important matter. And the cost of all solid fuels was nearly doubled, since the commencement of the war, but gas had not been increased in price to anything like a proportionate extent. Unreliability in starting, which meant loss of time in the workshop, also figured strongly on the discredit side, as also did extra attention, taking men away from regular work, such as blowing up in starting, attending to water supply, raking out and removing ashes, extra packing and attention to piston rings, valves, etc., due to imperfect condensation and purification of the gas.

After some prolonged experience of these difficulties, the customer offered to scrap the generators, etc., and return to town gas at a slight reduction on the price previously charged. When this proposal was accepted, he was gratified by the concession, and also had gas connections made to an engine, where petrol had been previously used.

At an up-to-date sewerage disposal works, Mr. Harrison had recently seen a twin set of gas engines with suction plant complete, but the generators had been discarded, and the engines were being run on town gas. The authorities would not have gone to the expense of laying on a supply from some distance, if considerations of economy or of efficiency had not been concerned. The action spoke for itself.

This piece of experience applies all round. It is not only in respect to power gas that customers find reason to regret having given up the use of reliable and uniform quality town gas. In a large district of supply, it would pay well if one of the employees specialized in the art of looking after the stray sheep.

Separate Lighting Division a Necessity for Gas Companies

Experience of Several Large Companies Has Fully Demonstrated Need of Such Division—C. A. Luther Discusses Experience of Chicago Company

It has been fully demonstrated by several large gas companies that a separate lighting division is a necessity, especially where there is a contention between the gas and electric interests to secure the business patronage of the prospective consumers by offering more advantageous equipment as an inducement to secure their trade, declared Charles A. Luther, in his paper on "Chicago's Experience with a Separate Lighting Division,"—from which the following has been abstracted—presented at the recent annual convention of the American Gas Institute.

Gas Industry Must Go Electrical One Better to Increase Lighting Business

That competition is the life of trade has been demonstrated time and again, but if the gas industry wants to increase its output through the medium of gas lighting units, as well as to hold the lighting business it now has, it must not only meet competitors half way, but must go them one better, for both the gas and electric interests are working for the same ultimate goal—to show the superiority of their respective commodity.

The day when each salesman or representative of a gas company sold all types of gas burning equipment, from the mantle burner to the hotel and restaurant or industrial appliance, is past. Most gas companies of any size now have a separate department that takes care of the hotel and restaurant and industrial, and another department that takes care of everything else including the lighting business.

The reason for taking the hotel and restaurant as well as the industrial appliances out of the hands of a general salesman, should also act as an incentive to start a separate lighting division to exploit everything pertaining to gas lighting, for specializing on any particular gas consuming unit is bound to bring more returns for the amount of energy exerted than can be accomplished when a salesman handles all kinds of appliances. A general salesman not only takes the path of least resistance by selling the easiest selling article, but also jumps from one gas consuming unit to another to the confusion of the prospective consumer.

Lighting Business Should Receive As Much If Not More Consideration Than That Accorded Other Branches

Practically all kinds of wholesalers as well as retailers subscribe to some trade journal that has incorported in its pages certain articles as well as advertisements that pertain to their respective business, and it is only natural that there should be articles on lighting in these different journals, inasmuch as it is of great importance for the merchants to know about one of the most essential things pertaining to their business, artificial illumination.

This being the case, there is no reason why we should not have a special force of men who are thoroughly drilled into knowing what is the proper type of lighting unit to use for the different classes of service they are to be used for, as well as the proper spacing and installation of same, and who can also converse instructively with the prospective consumer about all technical terms pertaining to the art of illumination.

I hardly believe that there is an official or manager of a straight gas company who will not substantiate my statement when I say that the lighting business is one of their most important branches and should receive as much consideration if not more than that accorded to other divisions.

What Should Constitute a Lighting Division

The number of men in a lighting division will naturally be governed by the size of the gas company, the area and population of the city and the ability of the division to secure the desired results.

In Chicago we are securing exceptional results from a lighting division that is composed of a manager, who has charge of the lighting division and who is responsible for the operation of same; two assistants, one of whom takes care of all office work, such as

the proper routing of all orders, checking the salesmen's daily reports as well as assisting the manager in any of the special problems that might come up, pertaining to the general routine of the department, and the other assists the men who are out in the field, on any installation that needs special attention, as he is a man who is possibly better qualified to handle a special proposition than the man who is out in the field and also does any special work for the manager; two special men, whose duties are to follow up all lamp remove orders that have been O.K.'d for removal by the salesmen in their respective districts; three supervisors, whose duties are to supervise the work of the salesmen in the different districts, check up their work, and, in general to see that the men do the proper amount of work each day; the necessary salesmen, and a clerk to tabulate the daily returns and furnish the manager with daily and monthly reports, as well as to keep the supervisors supplied with all the necessary stationery and prospects that are referred to this department.

Last but not the least, there must be a general meeting room where the men can get together as often as necessary. In Chicago the men report at this meeting room every Tuesday and Friday morning. The other mornings throughout the week they report to their supervisors at one of the branch stores in their respective districts.

In this general meeting room there is a large blackboard that extends across the front wall of the room. The board is sub-divided into a space for the men's names and a space for each day of the month. On this board is kept a record of each man's daily report of the amount of arc lamp business he secures.

We have found that this board has acted as an incentive for the men to do more work as it stares them in the face at every morning meeting held.

How Lighting Division Men Should Be Picked

The manager must be thoroughly competent to figure out any kind of a lighting problem, he must be able to organize and manage a department so as to secure the desired results, he must also have the ability to originate and construct special equipment for different classes of business, and, last, but not the least, he must know all about electric units as well as gas units.

The assistants must be men who have had a good deal of experience; preferably men who have good selling ability and have a good knowledge of the art of illuminating engineering.

The special men must be thoroughly versed in the candlepower and cost of operation of both gas and electric units, as well as the characteristics of different types of shades commonly used. They must also have the ability to convince the consumer that they are capable of handling any kind of a proposition pertaining to illuminating problems.

The supervisors must be capable of managing men to get the best results out of them and must be able to figure out lighting problems of all kinds, so as to assist the salesmen whenever it is necessary.

Great care should be taken in selecting salesmen. There are certain things that should qualify them for this position. They should present a neat business-like appearance, for the first impression they make on the prospective consumer goes a long way toward securing his business; second, they must have good judgment as well as a retentive memory; third, they must have courage, commonly called nerve; fourth, if they are to be selected from the employees of the gas company they should be taken from those departments that come in daily contact with the public.

Salesmen having these necessary primary qualifications should next be taught the rudiments of illuminating engineering so that they can gain proficiency as lighting experts.

The clerk can be selected from the office boys, providing he is bright, writes a good legible hand and has the ambition to work for advancement.

Compensation of Salesmen

The method of installing gas arcs by different companies will regulate the way salesmen should be paid, so instead of making an analysis of the different methods, I will confine myself to the system adopted in Chicago.

We have been experimenting for the past year by paying some of the men salary and commission, and the other men on straight commission.

Before going into details, it should be remembered that we rent and maintain all gas arcs we put out.

The salary and commission men are paid as follows: They receive a stated salary, and on all arc lamps rented, 50 cents each; on succession lamps, that is, where a party moves in where our arc lamps are already installed (we leave our lamps in any place they are safe) we pay 25 cents commission; on retained lamps, that is, where a consumer notifies us to remove our gas arcs and the salesman secures his signature to the remove orders, agreeing to retain the lamps, we pay 25 cents per lamp and for all other business he secures, such as fixtures, piping, etc., we pay him a commission of 5 per cent.

The straight commission men receive $1.50 on all rented lamps, 25 cents on succession lamps, 25 cents on retained arcs and on all other business 10 per cent commission.

The manager, assistants and special men are on straight salaries, but the supervisor's salary is based on the amount of work his salesmen do. He is paid the average salary of his men plus $15 per month.

From actual results, we find that the salary and commission basis gives us greater returns for the money invested than we receive from the straight commission men. The salesmen on salary and commission will pay more attention to successions and retains, while the commission men pay more attention to the items that bring in the most money.

The practice of paying the supervisors the average salary of their men plus $15 per month, is an incentive for them to see that the men who come under them do as much business as possible, for the greater the salesmen's returns the greater the returns of the supervisor.

Educating the Men to Become Lighting Experts

We have been very successful in educating our lighting division men so they can be classed as lighting experts, by means of the following system.

We furnish each man with a course in illuminating engineering compiled by us, which is divided into different sections; each section has from ten to twenty questions covering the most important features of each section. These questions must be answered and are checked over by the manager or one of his assistants, and if any of the questions are answered incorrectly, it is explained thoroughly to the salesman so he understands it clearly.

In the winter time we hold evening meetings twice a month and once a month in the summer time. At these meetings we have a free discussion on all phases of the lighting business. Gas and electric lighting equipment is thoroughly analyzed and we draw imaginary plans on the blackboard which the men equip with the proper gas outlets, and an itemized list of the necessary lighting units to be installed, their spacing, the height at which they should be installed and the cost of operating them, specifying the cost per day, per month and per year, including the pilot consumption and the rental of same.

At some of the meetings, we appoint one of the men as a gas salesman and another man as an electric salesman and require them to come in separately and call on either the manager or one of his assistants, who are supposed to represent a merchant, and present their proposition for lighting an imaginary loft or store. Then they are called in together and are allowed to get in on the final arguments for gas or electric equipment.

This has been conducive of teaching the men the selling arguments of both gas and electricity, inasmuch as the men in this department are required to criticise any blunders or omissions that either of the men should make, and, as the men do not know who will be called on until the night of the meeting, they naturally keep themselves primed at all times on both the gas and electric units.

At our morning meetings in the general meeting room, we take up a good many things with the men pertaining to their daily work that can also be treated as of an educational character.

Furnishing Men with Data

Each man is furnished with a loose leaf handbook that is supplied from time to time with blue print sheets covering some phase of our daily requirements.

Up to date, the men have the following sheets in their handbooks: Cuts and rental prices of all gas arcs we handle, cross section diagram sheets for plotting out the location of gas units,

sheets showing the different fixtures we sell, blank sheets for keeping a record of their calls and any other memoranda, blue print of bowling alley showing the type of units to be used and their proper location, blue print descriptive of the height and location of units for lighting pool and billiard tables, blue print, showing equipment and giving prices of fixtures and units for pool and billiard table lighting, blue print, comparative table of costs to operate gas arcs and tungsten units, for 1, 2, 3, 4 and 5 hours per day, per month and per year, also giving the efficiency of each unit by the cost per candle-power per year based on 5 hours per day, blue print, showing cost of operation of nitrogen units, blue print of safety first combination gas arc and sign equipment, blue print of photo reflector with plan showing how gas arcs thus equipped should be installed, blue print of chart showing number of light and dark hours each month between the hours of 6 a. m. to 10 p. m. and the number and percentage of hours for total light and dark hours per month, blue print showing a typical gas arc sign with the word "Lunch" on it, and the method of installing same, and blue print of candle-power *vs.* heat units, showing in a diagrammatic way the candle-power of open flame and mantle burners.

These blue prints have been of considerable benefit in helping the salesmen to secure business.

In addition to these, the men copy any data that they may secure from either the morning or evening meetings, on their memorandum sheets in their handbooks.

Keeping Efficiency Records

We keep an efficiency record of each man's work for each month in the year, which has been of great benefit to us in being able to tell not only which men are doing efficient work, but has also been of great help in increasing the salesmen's returns.

Every time a salesman's efficiency record shows that he has not been doing the proper amount of work, he is called into the office and his work is analyzed for his benefit.

In January each salesman is given a blue print of his previous year's work, and requested to go over it from time to time, to see whether he is improving in his work.

Specializing on Special Equipment

To keep gas lighting units constantly before the public it is absolutely necessary to originate new ideas that will appeal to those people who are in need of special equipment for their particular kind of work.

A little over two years ago we realized the necessity of producing a unit that would allow the public to accurately judge comparative shades of silk, ink, paper, cloth, etc., and at the same time give them a unit that would allow for a general distribution of light instead of the concentrated or spot lighting effect afforded by the electric units that were then in use.

The result was that we introduced the "Daylight Gas Arc" which had been scientifically worked out after about one year of experimenting, with the result that we secured the perfection we desired by producing glassware and mantles that gave us practically the same balance of red, yellow, green, blue and violet rays as found in daylight.

The result has been more than anticipated, for in the past two years we have put out over 8,000 of these units and have them installed in most all places in Chicago where they need a unit of this type and have a good many unsolicited testimonials covering them.

Knowing that we had a good many lamps installed that would have to be changed if we brought out a complete unit, we simply arranged to equip the regular arcs we were installing with the mirror shade, special globe and mantles, which allowed us to change the equipment of arcs already installed, wherever it was necessary.

Special Reflectors

There are certain places where it is necessary to provide special reflectors, such as photo studios, art galleries and any place where they desire the light to be concentrated in any particular spot or place.

We have met with very good success in installing these. In most cases they are used without daylight arcs, and, as the reflectors are adjustable for any angle, we can distribute the light wherever the consumer desires.

Knowing that there was a demand for safety first equipment, we originated the combination gas arc and sign unit. The gas arc is equipped with a red glass skirt that is very effective at night and as the regular globe is either clear or opal glass, it allows a generous amount of light to be thrown downward, lighting up the sign and sidewalk beneath the unit. The way the sign is attached does not permit the lamp being affected when the wind blows. We install everything except the sign which is furnished by the consumer.

Gas Arc Signs

Where a gas company expects to secure new outside arc lamp installations, they must originate new equipments for the various classes of business they serve, or in other words, they must anticipate the needs of the different consumers and be ever ready to assist them to make a perfect installation, an installation that will not only meet with their approval but one that will also appeal to other merchants in their immediate vicinity.

Gas companies should pay particular attention to the long hour consumers, as this is the most profitable business that they can secure.

In July, 1915, we started the scheme of installing these gas arc signs and up to the present writing have installed over 900 outside 3-mantle inverted arcs through this medium, which we would not have been able to install if we had not originated the idea of gas arc signs for that class of business, classed as long hour consumers.

These signs consist of from three to nine arc lamps and are suspended on a 1¼-in. iron pipe bracket which is braced by chains, and are properly equipped with drips above each lamp; in addition to this drip, another drip can be installed on the riser whenever necessary.

The lamps are equipped with opal globes and clear glass skirts over which is placed a wire protector to which the letters are attached. The letters are 5 in. wide by 7 in. high and are made of brass and coated with a flat black paint.

The black letters against the white opal globes makes the letters stand out very distinctly, not only when the units are lighted, but also in the daytime, while the volume of light that is secured from the row of lamps suspended across the sidewalk not only illuminates the sidewalk to a high intensity, but also lights up the windows, front of building and also part of the street.

It has been found that chains are the best type of support for gas sign brackets, and should be used whenever there is a chance of attaching them to the building so as not to produce too sharp an angle.

The chain supports will allow a certain amount of vibration to the units and do not allow the short sharp shocks that are produced when a stiff support is used. Particular attention must be paid to the bracing of these sign brackets, for in some instances there are six, seven, eight and nine lamps that extend in a row over the sidewalk.

The majority of the signs were installed in front of long hour consumers, such as saloons, restaurants, billiard and pool halls.

New Wrinkles Increase Returns of Salesmen

From time to time in a lighting division, you can work in new wrinkles that have a tendency to increase the returns of the salesmen.

For instance, each month the two men having the greatest number of net arc lamps installed are appointed captains and alternately pick the balance of the men for their respective teams; each of these teams try to make the best showing by the end of the month and the winning team is paid a bonus of $2.50 per man. If any man on this team shows by his monthly report that he has removed more lamps than he has installed, he does not receive any bonus.

In addition we have five prizes as follows: First, $2.50; second, $2.00; third, $1.50; fourth, $1.00, and fifth, $0.50 which are paid to the men who have the greatest number of net arc lamps irrespective of whether they are on the winning team or not. We secure as good results from these amounts as we would if they were five times as much, as there is a great rivalry between the teams to see which side can show the greatest net arcs installed. It is considered a great honor to be a captain.

We also try to educate our men in public speaking, by having them write papers from time to time to be read before the whole division, and from time to time call on them to talk about some subject of importance to the men as a whole, which has been of great benefit to the men in approaching their customers, as well as addressing business men's organizations.

All the salesmen are furnished each day with any prospects or letters that come into the main or branch offices pertaining to any business in their respective districts.

News of the Gas Industry

Col. John W. Ellis Dead

Col. John W. Ellis, president and general manager of the Providence Gas Company, died in his seventy-second year at his home in Woonsocket, R. I., Oct. 30. The cause of his death was hardening of the arteries with which he had been affected for some time, although only confined to his home for a little over a week.

Colonel Ellis was born in Woonsocket, R. I., Sept. 7, 1845, and was educated as a civil engineer in New Hampton Institute, New Hampton, N. H. He immediately took up engineering work for railroads in the New England states. Within a few years his reputation spread and he was called in as consulting engineer on many big projects in other cities.

In spite of the fact that he was a very busy man, he took much interest in public affairs and held several local offices. He served three years as alderman and also one term as State Senator.

His connection with the Woonsocket Gas Company for a number of years was so successful that he was chosen president and general manager of the Providence Gas Company in February, 1900, offices which he has retained since that time.

The loss of his active work in so many branches of life makes his death deeply felt throughout the country.

He is survived by his wife, two daughters and a son, who is a consulting engineer at Fall River.

More Salary for 3700 Employees

The Peoples Gas Light & Coke Company of Chicago, Ill., has voluntarily increased the wages of all employees who receive less than $200 a month, 10 per cent of their respective salaries beginning Nov. 1. The company realized that due to the high cost of living their employees were fighting an "uphill battle," and decided to remedy the matter.

Heating Load Aids in Adding 60 Per Cent Increase to Kentucky Company's Gas Output

The gas output of the Louisville Gas & Electric Company, during the week ending Oct. 21, was 60.7 per cent greater than that for the corresponding week last year. This increase is attributed to the large number of gas heating appliances which have been sold during the summer by the company and dealers. During the week in question 377 new gas heating appliance installations were made.

Rochester Daily Gas Output Record Shattered on Two Consecutive Days

On Sept. 28 and 29 the gas consumption in Rochester reached approximately 7,100,000 cu. ft. each day. The company's maximum daily gas sales record falls more than a million cu. ft. below the total of either day. At present there are 65,000 homes and places of business in the city lighted by gas as compared to 21,000 lighted by electricity.

Gas Demand Increasing at Rapid Rate

St. Petersburg, Fla., reports that at the present rate of increase the city gas plant will have to be run at a 75 per cent capacity this winter. The orders for new service are being received as rapidly as they can be handled and prepayment meters are going out to the apartment house people at a lively rate.

Free Maintenance of Appliances may be Inaugurated at Duluth

Free maintenance of gas appliances may be inaugurated at Duluth, Minn., according to an announcement made by D. A. Reed, manager of the municipal gas plant. It is estimated that a crew of eight men or less will be able to take care of the work, visiting each consumer at least once in two months.

Finely Lighted Barber Shop at Pittsfield, Mass.

The proper illumination of barber shops requires considerable care and study, in that the lighting of the chairs, so that proper tonsorial work can be done to best advantage, calls for nicely concentrated lighting, and at the same time the whole shop requires general lighting.

A six-chair barber shop at Pittsfield, Mass., is equipped with

GAS APPLIANCES PROVIDE EFFICIENT BARBER SHOP ILLUMINATION

an efficient system of illumination, consisting of a Reflex unit with reflector shade, over each chair, suspended to within about nine feet of the floor; and a 5-light inverted arc installed from the center of the ceiling, to give general illumination.

Gas Consumption in Philadelphia Increases 300 Per Cent in 19 Years

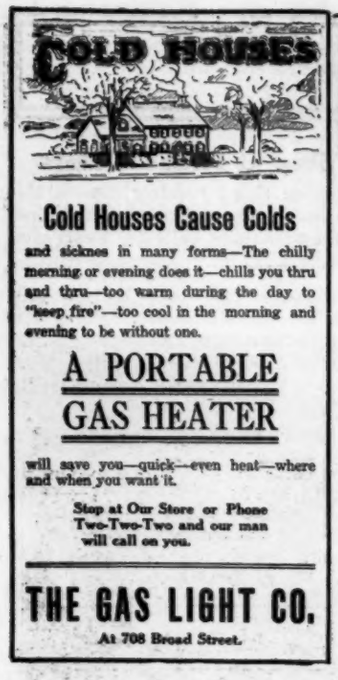
Sales of gas have increased virtually 300 per cent since 1897, when the United Gas Improvement Company assumed the management of the city's plant, according to a statement made by W. H. Gartley, in an address delivered, Oct. 27, before city officials, including Mayor Smith.

In 1897, when the United Gas Improvement Company leased the plant, the annual sales were 2,964,231,800 cu. ft., and they rose to 9,742,152,370 cu. ft. in 1915. The record day was Christmas Eve, 1912, when the sales were 48,927,000 cu. ft. It was a dark day, and the unusual consumption was due to the large gas consumption of stores. The mileage of mains in 1897 was 1,046, which increased to 1,551 in 1915.

The mayor expressed satisfaction with the leasing company's management.

The lecture, which was delivered at a luncheon in the Employees' Club, at the Twenty-fifth Ward Branch of the United Gas Improvement Company, at Richmond and Tioga Streets, was part of the program of an inspection trip made by the gas committee of the Select and Common Councils. Director Datesman, James E. Lennon, president of Select Council; Chief Bible, of the Gas Bureau; E. J. Cattell, city statistician, and others also attended. The city officials were accompanied by Samuel T. Bodine, president of the gas company, and others of its officials.

The party also visited the testing department, where 400,000 meters are looked after, and the experimental plant at Point Breeze. The latter is large enough to supply gas for a small town, and all advances in methods of production and distribution are studied there.


COLD HOUSES
Cold Houses Cause Colds
and sickness in many forms—The chilly morning or evening does it—chills you thru and thru—too warm during the day to "keep fire"—too cool in the morning and evening to be without one.
A PORTABLE GAS HEATER
will save you—quick—even heat—where and when you want it.
Stop at Our Store or Phone Two-Two-Two and our man will call on you.
THE GAS LIGHT CO.
At 708 Broad Street.

Augusta, Ga., Company Holds Successful Heater Campaign

The accompanying illustrations are reproductions of advertisements used in a recent heater campaign which proved very successful. More heaters were sold there this fall than ever before; many of them portable heaters and three cars of Gasteam radiators.

Waukesha (Wis.) Company Moves to Better Quarters

The Waukesha Gas and Electric Company has moved its stock and equipment to its new fireproof concrete and brick structure just completed on South Street. The new home being modern and up-to-date is in strict accordance with the company.

Decatur Has New Rates

The Decatur (Ill.) Railway & Light Company proposes to furnish gas at a rate of $1 a thousand for the first 5,000 cu. ft. and 95 cents per thousand cu. ft., over that amount. A minimum charge of 25 cents a month is to be made for each meter and 5 per cent discount is allowed for cash. This is a reduction of 5 cents on the old rates.

Cincinnati May Use Referendum In Attempt to Gain Lower Rates

The Peoples' Power League of Cincinnati, Ohio, is advocating a referendum vote in a fight to block the thirty-five cent gas ordinance. However, the Board of Directors of Cincinnati Chamber of Commerce in a recent resolution, expresses the belief that the rate "of 35 cents per 1000 cu. ft. is reasonable and equitable" and that "the referendum is unnecessary and cannot accomplish any beneficial results for the consumers, but may be means of bringing about a higher rate."

New Main for Webster & Southbridge Company

A new 4 in. pipe line of the Webster & Southbridge Gas & Electric Company, connecting these two Massachusetts towns and 12 miles in length, is noteworthy in that it is to be gas welded into a solid whole, the process eliminating danger of leaks. The main is laid 3 ft. under the surface.

The company has the remarkable record of serving the communities almost to saturation, there being one meter to each five inhabitants of the territory served.

The new line will enable the company to work the two plants, at Webster and at Southbridge, together, enabling one to assist the other as demanded, and providing against curtailment of service in the event of one of the plants being disabled. Apparatus is installed to pump the gas the length of the line.

Gas Reduction for Fort Smith (Ark.)

Since Nov. 1 the Fort Smith Light & Traction Company has been charging 15 cents per 1,000 ft. for gas to domestic customers as against a former charge of 30 cents.

Gas Rate Lowered for Eugene and Springfield, Ore.

A new rate of 75 cents per 1000 cu. ft. straight for gas for heating purposes, has been announced by the Oregon Power Company. A discount of 5 cents on each 1000 cu. ft. will be allowed if bills are paid before the tenth of the following month.

Independence (Mo.) Seeks Cheaper Gas

The people of Independence are paying $1.25 per thousand cubic feet despite the fact that the franchise calls for $1 gas from August 16. The company feels justified, however, and have appealed to the Missouri public service commission. A hearing is expected shortly by the city.

New Quarters for Greenfield (Mass.) Company

The Greenfield (Mass.) Gaslight Company is occupying fine new offices, recently fitted up for its occupancy. The entire front of the building is used as a showroom for appliances, while at the rear are the business offices and the private office of its superintendent, F. C. Butler.

St. Louis Company May be Taxed 5 Per Cent

A member of the Board of Aldermen appointed as chairman of an investigation committee recently announced that he would propose an ordinance providing the payment by the Laclede Gas Company of a tax of 5 per cent of its gross earnings. This was prompted by the fact that the Union Electric Light & Power Company is paying this 5 per cent tax.

113 Companies Now Subscribe to N. C. G. A. Window Service

Up to the present time 113 gas companies subscribe to the window service of the National Commercial Gas Association on the basis of $12 a year. This consists of one folder a month containing two suggestions for displays and giving instructions as to how to construct them. The displays are very attractive in design and should prove effective in attracting trade in appliances.

Western New York Companies Plan for Big Consolidation

An outline has recently been laid before the public service commission in Albany which proposes a merging of the Frost Gas Company, the South Shore Natural Gas & Fuel Company, the Fredonia Natural Gas Light Company, the Silver Creek Gas & Improvement Company and probably others in surrounding territory. The project which will bring more natural gas from without the state to the territory surrounding Buffalo, N. Y., will ultimately cost about $18,000,000.

Milwaukee, Wis., to Ask for Lower Rates

It has been announced that the railroad rate commission will be petitioned for a reduction in the price of gas at Milwaukee. The city attorney will base his petition on an alleged dividend of 21.6 per cent earned by the company upon the capital stock of $5,000,000 for the year ended June 30.

Baltimore Company Plans to Redeem Preferred Stock

A recent announcement of the proposed plan of the Consolidated Gas Electric Light and Power Company of Baltimore, Md., to redeem all of the company's $4,103,754 outstanding preferred stock at $120 per share on or before April, 1917, has caused considerable interest in financial circles.

The earnings of company in recent years have increased considerably, especially during the last fiscal period, when the surplus available for dividends was over $2,000,000, and after meeting the preferred stock payment there was a balance available for the common stock equivalent to approximately 14 per cent on the $14,385,734 outstanding.

A. H. Humphrey Declares Radiantfire Will Do For Gas Heating What Gas Arc Did For Commercial Lighting

A. H. Humphrey is so enthusiastic over the possibilities of the new Radiantfire gas heater that he predicts for it the same beneficent effect on gas for heating as the innovation that the gas arc had on gas for commercial lighting.

A. H. HUMPHREY

The Radiantfire heater is not put forth as an auxiliary. It is capable of real heating service, powerful enough to warm the largest rooms or offices. It is instantaneous in action and lights without the slightest noise. The radiants become immediately incandescent, throwing out a flood of radiant heat, free from odor, noise or dirt. It may be turned down low and burned that way, when only moderate heat is desired, and it extinguishes without the slightest "pop" or back-fire.

Radiantfire is constructed on scientific principles. The radiant energy is obtained from a powerful super-combustion burner, using gas as fuel. This combustion takes place within the porous lace-like fabric of the porcelain radiants which become heated to an intense incandescence. The Humphrey purple-flame, super-combustion burner which has been developed for the radiantfire, it is claimed, achieves a higher flame temperature by several hundred degrees than any burner hitherto produced, and is capable of continuous burning at full intensity without screens—without noise—and without back-fire, operating on normal gas pressure. The super-combustion, it is said, eliminates all odor, all puff or pop or back-fire either at the time of lighting or extinguishing and the heater is under perfect control so that it may be burned, turned down to any point. The burner has been developed along original lines in which multiple openings individually supply the radiants, and it is by the fashioning of these multiple outlets that the explosions have been eliminated.

At the maximum heat the gas consumption will not exceed 35 cu. ft. of gas per hour, but the Radiantfire need only be burned at full capacity for from 10 to 15 minutes, when it may be turned down to a consumption of from 20 to 25 cu. ft. per hour, sufficient to maintain the incandescence of the radiants and the flood of glowing radiant heat.

The heater has been designed to satisfy a wide range of service. The heater body consists merely of the cast-iron frame and porcelain heat deflector, onto which the burner and the radiants are fitted and over these the ornamental bronze housings. All exposed metal work is of finest quality in finish and proof against tarnishing.

A variety of design in the andiron and hearth trimmings provides harmonious equipment for rooms of various decorative treatment and affords selection to suit the taste of the purchaser.

The Radiantfire heater is manufactured by the General Gas Light Company of Kalamazoo, Mich.

Front Lighting to Advertise Advantages of Good Store Illumination

The Pittsfield (Mass.) Coal Gas Company has installed about 35 five-burner Humphrey gas arcs on the front of all the stores in one of the best business blocks in Pittsfield's principal commercial thoroughfare, North Street. The arcs form a continuous line, spaced at about equal intervals, and the nightly illumination attracts much attention. The cost of service is paid for by the occupants of the stores.

The gas company has already found that in addition to the volume of increased sales of gas, the installation is of marked value to it, in offering a graphic illustration of the efficiency of gas illumination, which results in improved store lighting, and in the selection of gas in preference to electricity.

N. C. G. A. Sends Out Train Schedules to Atlantic City

No special trains will be run to the annual convention of the National Commercial Gas Association, to be held in Atlantic City, Nov. 12 to 18, it having been determined that those attending were desirous of traveling by different trains. To facilitate arrangements, the committee on transportation is sending out schedules and rates of fare from various points. H. B. McLean, superintendent of the gas appliance department of the Consolidated Gas Company of New York, is chairman of the committee.

Pittsburgh Threatened with Natural Gas Shortage

Manufacturers at Pittsburgh have been officially notified of an impending shortage of natural gas that may last throughout the winter. The danger is so acute that they were advised to change their furnaces to allow for some fuel other than natural gas.

Courts Not to Interfere Before Public Utilities Commission Has Acted

In the suit of the city of Scammon against the American Gas Company the Supreme Court of Kansas held that the courts of Kansas had no right to interfere in the service troubles of cities and utilities until after the public utilities commission had acted and then the courts could be used to enforce the orders of the commission.

$266,000 Due City of Columbus (Ohio) is Court's Decision

The Federal Gas and Fuel Company in its contract made when granted a franchise in 1899 agreed to pay the city 10 per cent of all moneys received from the sale of natural gas sold at a price exceeding 15 cents per 1,000 cu. ft. For years their gas has been selling at 30 cents per 1,000.

The city laid claim to 10 per cent of all the company's receipts and the court of appeals has decided that $266,000 is the amount due the city. The case will undoubtedly be taken to the Supreme Court.

Waukegan (Ill.) Demands Lower Rate

Waukegan is one of the few North Shore cities and towns which refused the recent offer of rates made by the North Shore Gas Company. They have taken the case before the Chicago Utilities. Committee and the hearing has been continued till Nov. 9.

Domestic Consumers First

Fremont, Ohio, places the domestic convenience before the commercial demand and the Fremont Gas, Electric Light & Power Company has ordered the disconnection of factories, plants and industrial consumers in large quantities to protect the home service and gas engines against shortage.

Societies and Associations

The American Electrochemical Society and the Illuminating Engineering Society have planned an interesting program for their joint meeting, which is to be held Thursday evening, Nov. 9. There will be three speakers: W. R. Addicks, on "Some Notes on Gas Standards"; Elmer L. Knoedler, on "The Most Recent Developments in Incandescent Gas Mantles"; and Edward J. Murphy, on "The Chemistry of Modern Illuminating Gas Manufacture." The meeting will be held in the Engineering Societies building, 29 West 39 Street, N. Y.

The Society of Gas Engineering of New York City held its 94th regular monthly meeting in the Auditorium of the Consolidated Gas Company, 130 East 15th Street, New York City, Oct. 26. C. G. Atwater, manager of the Agricultural Department of The Barrett Company, delivered a very interesting illustrated lecture on the "Uses of Ammonium Sulphate." A paper on "Oil Gas, Benzol Enrichment, Acetylene and Natural Gas" and also one on "House Piping," presented by members of the society, brought forth interesting discussion. During the dinner which was served in the restaurant of the Consolidated Gas Company an interesting musical program was rendered. George E. Woods is president of the society, and A. F. Macklin, secretary.

NATIONAL SAFETY COUNCIL ELECTS OFFICERS FOR FORTHCOMING YEAR. The Public Utilities Section of the National Safety Council held a meeting at Detroit last week at which the following officers were elected for year ending October, 1917: Chairman, J. B. Douglas, The United Gas Improvement Co., Philadelphia; vice-chairman, H. A. Holdridge, Omaha Elec. Light & Power Co., Omaha; secretary, F. M. Rosseland, Chicago Telephone Company, Chicago; chairman Standardization Committee, F. D. Stiles, Boston Edison Company, Boston; chairman Publicity and Membership Committee, C. E. Paige, Malden & Melrose Gas Light Company, Malden.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS are planning a "Preparedness" Excursion on November 11 to the Electric Boat Company's Plant and the United States Naval Submarine Base at New London, Conn. The New York, Boston, New Haven and Worcester Sections will participate.

THE FLATBUSH GAS COMPANY EMPLOYEES' ASSOCIATION will hold their annual reception and dance on Thanksgiving Eve at the Cortelyou Club.

THE PITTSFIELD COAL GAS COMPANY EMPLOYEES' ASSOCIATION at a recent meeting decided to hold a "run together" every month. Good fellowship and exchange of ideas are sure to result.

Personal Notes

A. P. BUTLER has been appointed assistant office supervisor of the Old Colony Gas Company at East Braintree, Mass.

W. F. WATSON has been appointed commercial representative of the Old Colony Gas Company in Braintree, Mass. Mr. Watson has had many years' experience in the gas business.

GEO. P. SMITH, JR., superintendent of the Old Colony Gas Company, has been elected president of the New England Section of the National Commercial Gas Association.

CLARE N. STANDARD, secretary of the Denver Gas & Electric Light Company, operated by Henry L. Doherty & Company, has been elected treasurer of the tourist bureau of the Denver Civic Association.

S. M. RUFFNER, for several years superintendent of Springfield Gas Company, died at his home in Winfield, Kansas, October 19.

WILLIAM B. VOTH, formerly chief engineer of the Syracuse, South Bay Electric Railroad Company, Syracuse, N. Y., has been appointed manager of the Ogdensburg, (N. Y.) Gas, Power & Light Company. He is a graduate of the University of Wisconsin.

Construction Notes

Correction

Through an error on page 292 of the Oct. 30 issue of the AMERICAN GAS LIGHT JOURNAL, a construction note title read "Contract awarded for 11 Ft. Double Superheater Carbureter Apparatus at Denver." It should have read "Contract Awarded for 11 Ft. Double Superheater Carbureter Apparatus at Detroit."

Greenville (Miss.) Company Incorporates

The Greenville Gas Company has filed articles of incorporation with the secretary of state, giving the capital stock at $150,000.

Bremerton, Wash., May Now Get Gas

The City Council of Bremerton, Wash., has passed the gas franchise over the veto of the mayor and the chances of getting a plant capable of supplying 10,000 people, are favorable.

Perinton, N. Y., Franchise Granted

The Despatch Heat, Light & Power Company of East Rochester has been granted a franchise to lay its mains in the town of Perinton. The work of extending the lines from East Rochester to town of Fairport and Perinton is to be begun immediately.

Extension of Mains in Woodhaven, N. Y.

The Public Service Commission has ordered the Woodhaven Gas Light Company to extend lines and furnish service for twenty-eight new houses on Rector Street, north of Jamaica Avenue.

Melrose, Mass., to Extend Lines

Permission has recently been granted the Malden and Melrose Gas Company to construct a gas main on Sixth Street.

New Company to be Incorporated at Nashville, Tenn.

Application for a charter of incorporation has been filed by the Aetna Oil and Gas Company. The capital stock as authorized is $25,000.

More Gas Benches for Anniston (Ala.) Plant

The erection of additional gas benches at the gas plant of the Alabama Power Company has been authorized. The extension will cost about $8,000, and will make possible the serving of a city of 50,000 inhabitants. A by-product plant for manufacture of ammonia liquor is in contemplation.

Addition for Downtown Gas Works of Philadelphia, Pa.

An eighth acre at the corner of Passyunk Ave. and Newkirk St. has been procured for an enlargement of the gas works situated in that district.

Oshkosh (Wis.) May Have New Plant

The growth of the Oshkosh Gas Light Company has made expansion necessary. Although no definite plans have been made public, the land has been surveyed for what may be an entire new plant.

Lawrence (Mass.) Gas Plant to Extend Mains

The Lawrence Gas Company was granted permission to make gas extensions on Almont Street, Oakland Avenue, Ashland Avenue and Edgewood Avenue.

JUNEAU, ALASKA.—A franchise to erect a gas plant has been asked for by Geo. Irving and Frank L. Clark.

SAN GABRIEL, CAL.—The authorities have granted a 40 year franchise to the Los Angeles Gas & Electric Company.

ASHTON, R. I.—Residents of this community are desirous of gas service, and the town clerk has written the Pawtucket Gas Company requesting that residents of the upper part of the town be given service.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,200,536: GAS-STOVE. Frederick G. Skelton, Brooklyn, N. Y.

1,200,719: METHOD OF MAKING GAS RICH IN CARBON MONOXIDE. Hans Foersterling, Perth Amboy, N. J., assignor to The Roessler & Hasslacher Chemical Co., New York, N. Y.

1,200,857: GAS-PRODUCER. William J. Lay, Melville, Saskatchewan, Canada.

1,201,029: INCANDESCENT GAS-LAMP. Robert E. Ewing, Gloucester City, N. J., assignor to Welsbach Light Co., same place.

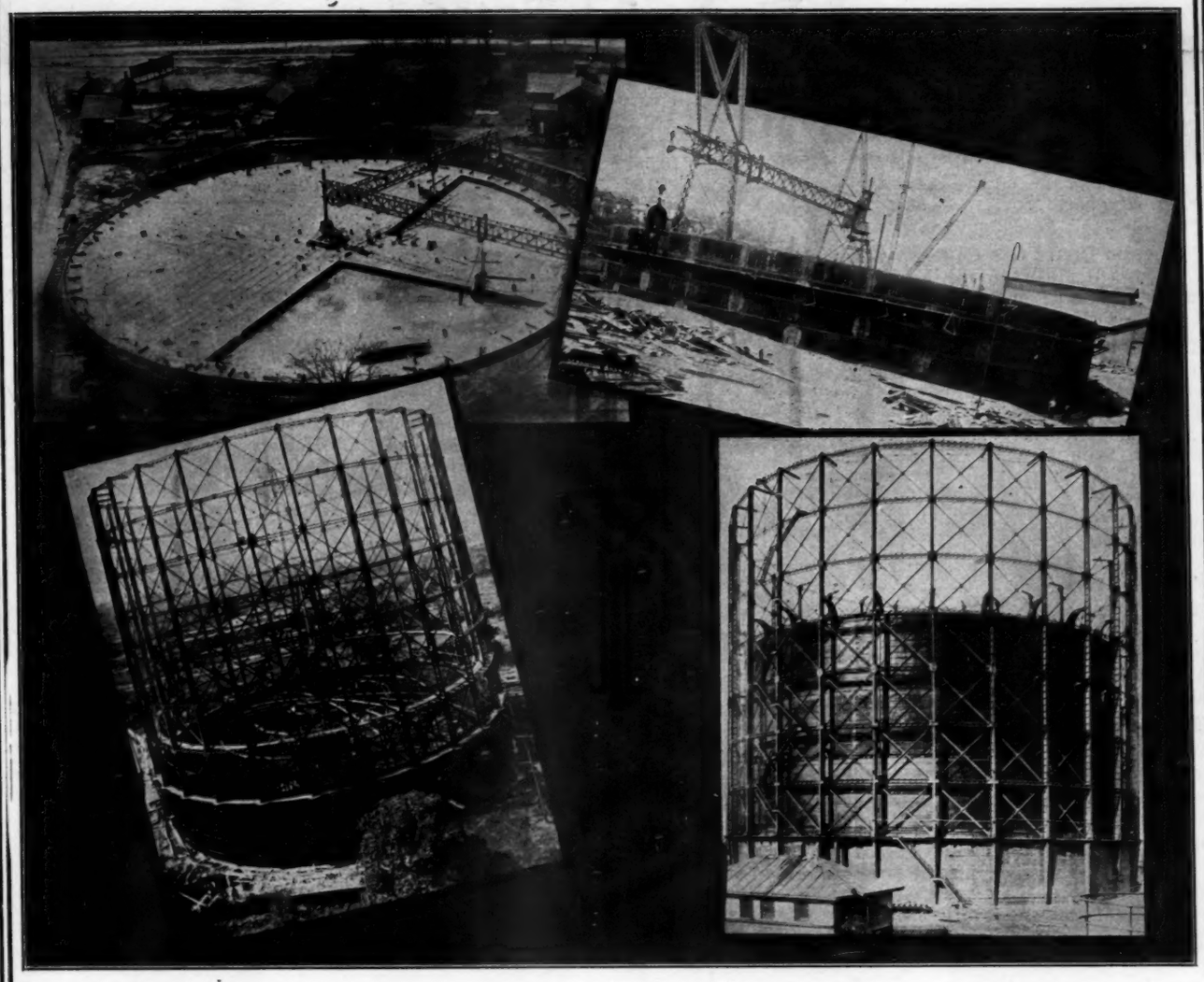
1,201,030: INVERTED INCANDESCENT GAS-LAMP. Robert E. Ewing, Gloucester City, N. J., assignor to Welsbach Light Co., same place.

1,201,531. REVOLUBLE RETORT. Walter Thomas, Nanaimo, British Columbia, Canada.

1,202,079. CLUSTER INCANDESCENT GAS-LAMP. Howard Lyon, Gloucester City, N. J., assignor to Welsbach Light Co., same place.

1,202,080. CLUSTER-LAMP FOR INVERTED LAMP MANTLES. Howard Lyon, Gloucester City, N. J., assignor to Welsbach Light Co., same place.

1,202,736. GAS-BURNER. Fred Kling and Luther Weidlein, Youngstown, Ohio.



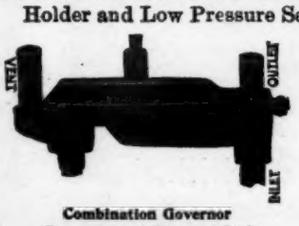
RITER-CONLEY COMPANY

STEEL CONSTRUCTION

PITTSBURGH

REYNOLDS GOVERNORS

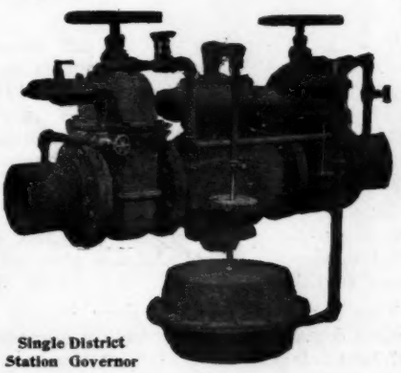
We make anything desired in the GAS GOVERNOR or REGULATOR to meet any and all classes of reductions. Stations for DISTRICT SERVICE, INDIVIDUAL HIGH PRESSURE GOVERNORS for reducing high pressure gas to inches of water. Holder and Low Pressure Service Governors. A steady, uniform pressure can be obtained by using REYNOLDS GOVERNORS, "THE WORLD'S STANDARD." We make a specialty of the Governor business, devoting our entire time to the manufacture of same. All Governors are GUARANTEED.



Combination Governor
Governor and Mercury Seal

REYNOLD'S GAS REGULATOR COMPANY
ANDERSON, INDIANA. U. S. A.

Write for instructive Catalog



Single District
Station Governor

Financial Notes.

THE BLACKSTONE VALLEY GAS & ELECTRIC COMPANY reports the following earnings:

August	1916	1915	Increase
Gross	$137,558	$126,976	$10,582
Net	54,184	53,032	1,152
Sur. af. chgs.	33,869	34,067	*198

*Decrease.

THE OHIO CITIES GAS COMPANY reports for the four months ended July 31, 1916, to the New York stock exchange, gross earnings amounting to $287,261; operating expenses and taxes, $37,953; net after taxes, $249,308.

THE SOUTHERN CALIFORNIA GAS COMPANY has furnished to its securities holders the following statement of its earnings for the twelve-month:

12 mos. ended Sept. 30,	1915	1916
Gross earnings	$990,529.73	$982,361.66
Oper. exp., main, taxes	605,983.24	653,303.38
Net income	$384,546.49	$329,058.28
Bond interest	194,700.00	194,700.00
Other interest	33,170.66	38,485.83
Balance	$156,675.83	$95,872.45

THE WESTERN UNITED GAS & ELECTRIC COMPANY'S gross and net earnings continue to rise. For the month of September there was an increase of 7.71 per cent in net earnings over September, 1915, and the increase in gross for the same period was 6.24 per cent.

THE CENTRAL CALIFORNIA GAS COMPANY reports for year ended Sept. 30 gross revenue $87,743, net revenue $40,620.

THE COAST COUNTIES GAS & ELECTRIC COMPANY reports gross earnings estimated at $360,919, increase $21,609; net after taxes $166,387, increase $6,300.

THE PACIFIC GAS & ELECTRIC'S board of directors met on Oct. 31 to declare the regular quarterly dividend to that date of $1.50 a share each on the first preferred and the original preferred stocks, payable Nov. 15 to holders of record at 3 P. M. Oct. 31.

THE MASSACHUSETTS GAS COMPANY trustees declared a regular semi-annual dividend of $2 on preferred stock, payable Dec. 1 to stockholders of record Nov. 15.

THE MANUFACTURERS LIGHT & HEAT COMPANY and subsidiaries report gross earnings for nine months ended Sept. 30 as $5,375,150; operating expenses and taxes $3,131,516; net earnings $2,243,634; other income $39,755; total income $2,283,389; charges, etc., $72,919; balance, $2,210,470; dividends, $1,380,000; surplus, $830,470.

THE CUMBERLAND COUNTY POWER & LIGHT COMPANY reports gross earnings for August amounting to $306,679, increase $21,296; net after taxes $139,642, decrease $5,342; surplus after charges $70,464, decrease $9,517. Twelve months' gross $2,783,082, increase $215,160; net after taxes $1,103,398, increase $726; balance after charges and dividends $166,756, decrease $17,642.

THE MONTANA POWER COMPANY reports gross earnings for the quarter ending Sept. 30 amounting to $1,507,967, as against $1,082,319 for corresponding quarter of 1915; net after taxes was $1,141,294, against $784,624, with surplus after charges of $825,031, against $487,350. Nine months' gross earnings were $4,411,721, against $2,992,526 in first nine months of 1915; surplus after charges $2,376,636, against $1,276,628 last year.

THE NEW ENGLAND POWER COMPANY reports gross earnings for September amounting to $165,725, increase $46,727; net $83,406, increase $5,334; balance after all dividends $2,827, decrease $1,073.

THE PHILADELPHIA COMPANY reports gross earnings of its various departments for September aggregating $554,353, increase $97,482; net after taxes $235,531, increase $26,501. Six months' gross $3,717,302, increase $635,552; net after taxes $1,941,016, increase $431,787.

THE H. M. BYLLESBY COMPANY report that net earnings of their utility properties for the year ending Sept. 30, 1916, were 10.88 per cent greater than for the corresponding previous year. Comparative figures for the month of September and the twelve months ended Sept. 30 are as follows:

Month of September	1916	1915	Increase	% Inc.
Gross Earnings	$1,327,185	$1,206,859	$120,326	9.97
Net Earnings	633,223	580,758	52,465	9.03
Year ended September 30				
Gross Earnings	16,649,362	15,269,909	1,379,453	9.03
Net Earnings	8,190423	7,385,851	804,572	10.88

THE REPUBLIC RAILWAY & LIGHT COMPANY has drawn for redemption Dec. 1 at par and accrued interest, payment to be made by Fidelity Trust Company of Philadelphia, $484,000 of its 3 year 5 per cent secured gold notes. Interest on notes drawn for redemption will cease Dec. 1. Holders have right to convert, par for par, into 7 per cent preferred stock of Mahoning & Shenango Railway & Light Company, subsidiary of Republic Railway & Light Company.

Current Prices of Public Utility Securities

	Bid	Asked
Adirondack Elec. P.	25	26½
Adirondack Elec. P. pf.	82	85
American Gas	120	123
*American Gas & Electric	153	156
*American Gas & Electric pf.	49	51
American Light & Traction	384	388
American Light & Traction pf.	111	113
American Power & Light	75	76
American Power & Light pf.	84	86
American Public Utilities	42	46
American Public Utilities pf.	74	77
American Water W. & Elec.	9¼	10
Amer. W. W. & E. 1st pf.	68	71
Amer. W. W. & E. part'p pf.	23	26
Carolina Pow. & Lt.	28	31
Carolina Pow. & Lt. pf.	97	100
Cities Service	319	323
Cities Service pf.	92¼	94
Colorado Power	29	30
Colorado Power pf.	100	101½
Commonwealth, Pr. Ry. & Lt.	61	63
Commonwealth, Pr. Ry. & Lt. pf.	84	86
Electric Bond & Share pf.	99½	100
Empire District El. pf.	90	95
Federal Light & Traction	18	20
Federal Light & Traction pf.	56	59
Gas & Electric Securities	290	310
Gas & Electric Securities pf.	95	100
Northern States Power	104½	106½
Northern States Power pf.	100	102
North. Ont. Lt. & P.	14	17
North. Ont. Lt. & P. pf.	56	61
Ozark Power & Water	44	48
Pacific Gas & Electric	58¼	58¾
Pacific Gas & Electric pf.	90	92
Republic Ry. & Light Co.	49½	51
Republic Ry. & Light Co. pf.	78	80
*Standard Gas & Electric	14¼	16¼
*Standard Gas & Electric pf.	42¾	43
So. Cal. Edison	92½	93½
So. Cal. Edison pf.	106	109
Tennessee Ry., Light & Power	13	13½
Tennessee Ry., Light & Power pf.	52¾	53¾
United Light & Railways	50	51
United Light & Railways 1st pf.	79	81
Western Power	18½	20
Western Power pf.	69	71

*Par value $50